

MEYER (H.)

Procrustes Ante Portas.

WHY THE SHOE PINCHES;

A

CONTRIBUTION TO APPLIED ANATOMY,

BY HERMANN MEYER, M. D.,

PROFESSOR OF ANATOMY IN THE UNIVERSITY OF ZURICH.

Translated from the German by

JOHN STIRLING CRAIG, L. R. C. P. E., L. R. C. S. E.

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PREFATORY REMARKS TO THE AMERICAN EDITION.

Rather than on account of any *novel* and *practically* valuable directions therein contained, in reference to the *proper construction* of BOOTS and SHOES, the object of this reprint of *Professor Meyer's* pamphlet is to show that men of such scientific and professional eminence do not regard it as a subject beneath their attention.

His pamphlet also contains many suggestions in reference to the production of various distortions by the foot gear in common use, and had it been in this country prior to the publication of mine on "THE MECHANICAL AFFECTIONS, and MECHANICS AND MECHANICAL ANATOMY of the bony structure of the HUMAN FOOT," it might have been inferred that many ideas had been derived from that source. Such, however, is not the fact.

Aside from having the wood cuts in black-ground instead of white, and their transposition from the text to the last four pages, no departure has been made from the Edinburgh edition.

Boston, February 20, 1861.

J. C. PLUMER.

PREFACE BY THE TRANSLATOR.

The subject of the following pages may at first sight appear trivial, but I make no apology for having translated what so eminent an anatomist as Prof. Meyer has thought fit to write.

Our ideas as to what is *elegant and proper* in regard to the feet being so radically bad, I have no hope that the promulgation of the proper shape of the shoe, will have any sensible influence in reforming the *fashions* of the day.

There are, however, many who, having outlived the vanities of fashion, sigh for a little comfort did they only know where to find it; who for years have been exerting their ingenuity, and trying in vain, *by means of lasts made for their feet*, and various other expedients, to attain to the simple luxury of a comfortably fitting shoes, and these I am sure will feel thankful for the information now afforded them.

Parents, too, may be induced to see that the feet of their children are not made deformed before they are fully developed; and I believe that a great boon would be conferred by the introduction of the proposed shape of shoe into the infantry regiments of our army, in which, as is well known, numbers are continually breaking down in the feet when on long marches.

It is in his honest endeavours to minister to the mistaken ideal of an erring generation, that the shoemaker in his "cheerful infinitude of ignorance" as to the *structure and mechanism of the foot*, appears upon the scene and *does so much harm, maiming and deforming* the part of the body for which he ought only to provide protection.

It may possibly be thought that the evil consequences of badly-made shoes have been somewhat exaggerated by Professor Meyer, or at all events that the more serious results are, in this country, very rare. *I can only say that my own experience fully confirms his, and that I have more than once seen patients seek relief from the effects of a bunion in partial amputation of the foot.* How much suffering is endured from nails growing in is too well known; and but a few months have passed since a professional brother, and personal friend of my own, *actually lost his life while under chloroform for an operation rendered necessary by this cause.*

As to the unseemliness of distorted feet and shoes there really can be no exaggeration. Since my attention has been more particularly called to the subject, I have been naturally led to make observations more carefully than usual on the state of all feet coming under my notice in the street and elsewhere, and I find this result,—that men's *boots and shoes* being stronger are less liable to distortion, and their feet more so, while *ladies' feet* suffer less, and their shoes more, than those of the other sex; so much so, that it would appear quite ungallant to state the conclusions I have come to, on reliable grounds, as to the proportion of distorted boots among the fair sex. They may console themselves, however, by knowing that these deformities are only *apparent*, and that it is in reality, the

true form of the foot asserting itself against fashion's corrupt shoe, and that to remove them they have only to show sufficient moral courage to adopt the Proper Shape, as hereafter set forth.

There is one other subject of some importance of which I am anxious to say a few words; I refer to the remarks on gout, at page 16 of the text. In a country where gout is so common as our own, these remarks will be apt to be passed over as entirely fanciful, and without attracting the attention they deserve. Nevertheless, it is certain that the almost universal occurrence of first attacks of gout in the joint at the ball of the great toe may be fairly attributed to the existence of a *locus minoris resistentiæ*. Boerhaave, Van Swieten, Sir Charles Scudamore, and many other more recent authorities, were fully aware of this; but no one urges it more strongly than Dr. Garrod, the latest and best authority of this disease, who, at page 49 of his excellent treatise (London, 1859,) says that "after accidents, and like causes, weakened parts are more susceptible to its influence," and then mentions cases in which first attacks, instead of appearing in the usual seat, were limited to the knee or other parts that had suffered from previous injuries. At page 354, he remarks, that "the metatarso-phalangeal joint is one which is subject to pressure and injury from having to support the weight of the body," and he adds, thereby affording impartial evidence as to the evil effects of an improperly shaped shoe, that he has, in many individuals who had never experienced any symptoms of gout, "very commonly found distinct evidence of injury on the surface of the cartilage, both of the head of the metatarsal bone and of the cup-like cavity of the phalanx." All this clearly points to a weakened part, and the merit of our author is in directing attention to the true cause of its production, for the metatarso-phalangeal joint is not, as Dr. Garrod says, actually injured by having to support the weight of the body, but by its having to do so in a constrained and unnatural position.

I may add, what must be well known to most professional readers, that Professor Meyer is the most recent and approved authority on the structure and mechanical adaptations of the foot and lower limbs. His researches on standing, *Das aufrecht Stehen*, (*Erster und zweiter Beiträge zur Mechanik des Menschlichen Knochengerüstes*), and on the knee-joint, *Die Mechanik des Kniegelenks*, appeared in Muller's *Archiv* in 1853, and have since been incorporated in the *Lehrbuch der Physiologischen Anatomie*, published by our author in 1856, where also will be found his account of the mechanism of the foot (p. 133 *et seq*). Knowing, from statements made in his public lectures, and also from his recommending to his students the study of Professor Meyer's *Physiological Anatomy*, the high value set on these researches by Professor Goodsir of Edinburgh, I have submitted my proof-sheets to him, and am glad to be able to make use of his name as a guarantee for the correctness of my rendering of Professor Meyer's anatomico-physiological details; and I take this opportunity of acknowledging my obligations to my friend and former teacher for much valuable advice, and especially for the following expression of his opinion, which he has kindly permitted me to insert here:—

"The simplicity of the principles inculcated in Professor H. Meyer's work on the "Correct Form of Shoes" impresses the intelligent reader with confidence in their importance and applicability. Their simplicity consists in their scientific

character. The author of the work has largely contributed to the recent rapid advance of anatomy and physiology which is due to the employment of more direct and refined methods of investigation. By his researches, more particularly into the structure and actions of the lower limbs, he has given to our conceptions in this department of the science a precision which could only have been attained by the physico-mathematical method of investigation which he employed. The value of his results can only be properly estimated by the anatomist and physiologist; but his practical application of certain of them in the work which you have rendered so successfully in English, cannot fail to be fully appreciated by the general reader."

In conclusion, I have to thank Professor Meyer for his courteous consent to my undertaking this translation, and for the additions with which he was kind enough to favour me. I have also to express my obligations to his publishers, Messrs. Meyer and Zeller of Zurich, for allowing me to have the wood-cuts used in the original.

STRATFORD-ON-AVON, *July*, 1860.

PREFACE BY THE AUTHOR.

The greater part of the following pages appeared, in the spring of 1857, in the second volume of the "Monatschrift des Wissenschaftlichen Vereins in Zurich," under the title of "Procrustes ante Portas! Ein Culturgeschichtliches Zeitbild." As its title indicates, this paper was a pretty sharp satire on the many deformities which, through vanity or ignorance, have been thoughtlessly or intentionally inflicted on our bodies. On various occasions I have briefly alluded to evils of this kind, and dwelt more particularly on the errors in the usual form of coverings of our feet, at the same time giving hints how a more suitable shoe might be obtained without prejudice to the ever-primary consideration of elegance. My attention had been directed to the subject in the following manner:—On the one hand my experiments on the mechanism of walking, published elsewhere, led me to remark how utterly bad our foot-clothing is; and on the other, my position as a teacher of anatomy gave me abundant opportunities of observing the *almost incredible deformities* of the human foot, resulting from the *pressure of the shoe*. Several well marked cases having come under my notice in rather rapid succession, I wrote the paper above alluded to, to make known, once for all, my opinions on the subject.

The matter excited much attention amongst those who had the opportunity of seeing this paper, and many medical men recognized, with great interest, the importance of the question involved. From the most varied sources I have since been urgently requested to recast this essay in a separate form, so that its contents might become known to a still wider circle of readers.

I confess having hesitated somewhat to comply with these demands. My scruples were overcome, however, by a consideration of the *great importance* of the subject, and I yielded the more readily that anatomists so distinguished as Peter Camper and Sommering had preceded me with similar lucubrations,—the former with his paper "On the Best Shoe," and the latter with a treatise "On Stays." Moreover, *it especially behooves anatomists to speak out on such subjects*, since, from the nature of their studies, they have at hand the *proper material* for settling such questions.

The subject treated by Sommering concerns only one-half of mankind; and of this half, only those who are sufficiently *foolish* voluntarily to sacrifice comfort, health, and beauty to an absurd fashion.

In the case of the *shoe*, however, *all mankind* are equally interested; and the ventilation of the subject is the more important that we submit *in ignorance* only, and do not *voluntarily subject ourselves* to those injuries to *health*, and, it may be added, to *temper*, directly and indirectly inflicted by *badly shaped shoes*.

Camper, writing on this subject in the last century, very truly remarks—"All horse-doctors and horse-fanciers are interested in the shoeing of their *horses*,

numerous papers appear thereon, and shall we not concern ourselves about the foot-gear of *man*?"

Camper's suggestions attracted considerable attention, but his plans found little or no encouragement, because they were so very *impracticable*, and, above all, because of the very *clumsy form* of shoe herecommended.

May my little work be found more practical! I have, at all events, tried to produce a form in *unison* with the claims of *elegance*, and various trials have proved that my plans may be carried out with success.

HERMANN MEYER.

ZURICH, *December*, 1857.

WHY THE SHOE PINCHES.

WHAT THE OBJECT OF A COVERING FOR THE FOOT IS, AND WHAT CONDITIONS THIS HAS TO FULFIL.

We put on shoes for precisely the same reason that we wear clothes on other parts of our bodies, namely, that we may be *protected from injurious external influences*.

The influences from which we desire to be protected are *roughness of the ground* on the one hand, and *cold and wet* on the other.

When the roughness of the ground only is to be provided against, the sandal—consisting of a sole of stiff leather or wood, fastened by thongs or bands so as completely to cover the underpart of the foot—is sufficient.

But if protection from cold and wet be also desired, the sole has generally added to it a covering for the whole foot, and part of the leg. This covering may be made of various stuffs, but usually consists of soft leather. When thus combined with the sole, the upper leather further serves to keep the sole firmly fixed under the foot, and thus does away with the need of bands and thongs. Such combinations of upper leather and sole are called boots, shoes, etc.

A shoe, then, has to afford *protection against unequal and rough ground*, as well as against *cold and wet*. This is the object of a covering for the feet.

A covering for the foot has, however, to fulfil this object in a manner that will give rise to no *disadvantage*, the existence of which would essentially diminish the benefits of protection. The remedy would in this case be worse than the evil. Here, however, Fashion, so unfortunately mixed up in all our clothing relations, steps in and must even have *her say* on the shape of the shoe. So long as the influence of fashion is confined to the *cut and amplitude of the coat, the form and color of the hat*, and the like, the only harm that accrues is the probable production of a somewhat *ludicrous* effect. It signifies little, so far as health is concerned, whether a man wears a gray coat or a brown one, but it is of some importance whether the shoes he wears be *broad or narrow, rounded or pointed, long or short*. The shape of the shoe has too much influence on *health and comfort* to be left to the *dictates of fashion*.

The influence of fashion on the shape of the shoe produces the most *baneful effects on the mechanism of the foot and on its soundness*, and thus materially affects our moving about, and our consequent ability to take a sufficient amount of open air exercise.

It is quite clear that the foot *must get inside the shoe*, and if the shoe differ in shape from the foot, it is no less plain that the foot, *being the more pliable*, must of necessity adapt itself to the shape of the shoe. If, then, *fashion prescribes an arbitrary form of shoe, she goes far beyond her province, and in reality arrogates to herself the right of determining the shape of the foot*.

But the foot is a part of the body, and must not be changed by fashion; for our body is a gift, and its several parts are beautifully adapted for the purposes for which they were intended. If, therefore, we in any way change its normal form, not only do we *not improve*, but we actually *disfigure* it. Of this truth many a lady must be painfully aware who has not been able to resist the temptation to lace herself into what is called a "fine figure;" and he too must know it who has permitted his feet to be remodelled by fashionable boots.

We do not indeed at first sight fully perceive the *arrogant absurdity* of which fashion is guilty in going so far as to *determine the shape of our feet*, because we are not alive to the fact that the case is *peculiar* to the feet. We only see it influencing the shape of the *shoe*, and come to the conclusion that it may regulate this as well as the cut of the coat. To this prevalent opinion we yield, regardless of the influence on the shape of the *shoe*, and thereby on the *foot*. As well indeed might Fashion one day come to the conclusion that fingers are inelegant, and decree that henceforth the hand be *squeezed into a conical leather bag*;—as well indeed might she in one of her freaks forbid the display of our arms, and bind them firmly to our bodies like those of children in swaddling-clothes.

The shoe ought to *protect* the foot, but it has no business to *distort* its shape.

Shoemakers should be aware of this, and try to make the covering of the foot a suitable one. The best of them, however, are *grievously ill qualified* for this task if they are *ignorant of the principles* on which they ought to proceed in the construction of shoes really fit to serve their purpose, or if, from thoughtlessness or timidity, they stick fast to the *pernicious forms in general use*. To those amongst their number who think for themselves, and who understand their business, the following hints on the *proper construction* of the shoe will be welcome.

A shoe which will really be a *help to walking*, and not, as is too often the case, a *hindrance*, should be adapted to the *shape of the foot*, and this must accordingly first occupy our attention.

ON THE STRUCTURE OF THE FOOT.

The foot consists of *six-and-twenty bones*, very beautifully arranged, and admitting of more or less motion on one another.

Fourteen of these bones belong to the toes, the remaining twelve enter into the formation of the TARSUS and METATARSUS.

FIG. 1.—The METATARSAL bones are the five long bones (*a*). With the fore-part of these, the toes form joints. The remaining seven are the TARSAL bones, and one of these, the ASTRAGALUS (*b*), is embraced on each side by a projection (MALLEOLUS) from the bones of the leg, thus forming the ankle joint.

FIG. 2.—If the inner aspect of the foot is examined, we find that it is in an arch, resting in front on the anterior heads of the five METATARSAL bones (*a*), but *principally on that of the great toe*, and, on the CALCANEUM or heel (*b*) behind. The ASTRAGALUS (*c*) forms the *key-stone* of the arch.

The arch is enabled to retain its form by means of strong ligaments or bands passing from one bone to the others; and, thus held closely together, sustains the superincumbent weight of the body without giving way.

When we rest on the foot, as in standing, *the arch is flattened by the pressure from above*; and, consequently becomes lengthened. When, however the foot is allowed to hang free, *the curvature of the arch is increased*. At every step in walking also, when the foot is raised from the ground, the curvature *immediately becomes greater through the action of the muscles*.

The toes lie in front of the metatarsus, and are connected with it by joints. Each of the smaller toes has *two joints*,—the great toe only *one*.

The great toe plays by far the most *important part* in walking; because, when the foot is raised from the ground with the intention of throwing it forwards, we first raise the heel, then rest for a second on the great toe, and in lifting this from the ground the point of it receives a pressure which impels the body forwards. Thus, in raising the foot, the whole of the sole is gradually as it were “unrolled” up to the point of the great toe, which again receives an impetus by contact with the ground. The *great toe* ought therefore to have such a position as will admit of its being unrolled in the manner described; that is to say, it must so lie that the line of its axis, when carried backwards, will emerge at the centre of the heel; and this is its position in the *healthy foot*. The sole of an almost sound foot is given in Figure 3, and the true position of the great toe is indicated by the dotted line. This relation is still better brought out in Figure 4, which represents the *well-preserved foot of a child about two years old*. The line drawn through both figures is that in which the foot *unrolls* itself from the ground. The smaller toes, however, are by no means without their uses. In standing they rest on the ground, and give *lateral support to the foot*; while, in walking, they are bent in a peculiar manner, so that they are firmly pressed against the ground,—and here, too, they support the foot laterally. The first joint is strongly bent upwards, while the second is hollow above. This peculiar curvature enables the toes in a measure to *lay hold of the ground* as with bird’s claws.

ON THE CONSTRUCTION OF THE SOLE OF THE SHOE IN THE ORDINARY WAY.

In proceeding to make a shoe to order, the shoemaker measures the foot at various points; but of all the measurements he takes, none have a decided influence on the shape of the *sole* except the *length*, and perhaps the circumference of the foot at the root of the toes.

The length, however, is in all cases the more important, and in proceeding to plan out the sole, it is laid out in a straight line, a little is added to it, and the sole receives one of two shapes, according as the shoe is intended to fit the right or left foot, or either foot indiscriminately. If the shoe is intended to be used for either foot, the line alluded to forms the centre round which the outline of the sole is symmetrically constructed, as in Figures 5 and 6. The straight boundary line in front of the heel forms a right angle with the middle line.

If, however, as is more usual, the shoes are made for the right and left foot respectively, the outline of the sole corresponding to one foot only (Fig. 7), then the construction of the sole and heel is precisely the same as before; and the

only difference is in that intermediate part called by shoemakers "the waist." The outer line of this waist is curved outwards, especially in its anterior part; whilst the inner line also takes an outward direction. The "waist" between the heel and the sole is thus curved outwards, whilst in a straight shoe it is perfectly symmetrical. The straight line in front of the heel forms a right angle with the beginning of the curve. The two kinds of sole, although apparently different, are essentially the same, as is made clear by reference to Figure (8), in which the one sole is laid over the other.

The point of the sole may be made broad or narrow, as fashion dictates.

HOW SHOES WITH SOLES CONSTRUCTED IN THIS WAY PRESS THE FOOT OUT OF SHAPE.

If we compare the sole of the usual construction with the actual form of the foot, it will be found that, *apart from its smallness*, it has deviated entirely from the *form of the foot*, as will readily be seen by comparing the soles represented with Figures 3 and 4.

In making this comparison we also perceive how the foot is injuriously acted on since it must be forced, by the upper leather, into a shape corresponding to the outline of the sole. This cannot be avoided, indeed, for the toes are squeezed together from both sides, and the pressure is necessarily greatest where the shoe is narrowest. If we examine more particularly as to how the position of the toes is in this way affected, we find that the following changes take place.

From the outside the four small toes receive a pressure which forces them against each other, and also against the root of the great toe, which is thus pushed inwards.* The point of the great toe is besides pressed outwards, and the *middle line, or axis*, of the toe thus becomes oblique. This obliquity of the great toe thus results from the *inward pressure* on the root by means of the smaller toes and the *outward pressure* on the point directly inflicted by the upper leather.

The distortion which thus arises in the foot is very important, for the almost retriangular triangle in which the toes naturally lie, is converted into an isosceles actuangled triangle, and in this the toes are expected to find place. It is well if they can do so side by side, but this treatment is constantly giving rise to the most mischievous distortions, *at first only manifested while the shoe is worn*, but eventually becoming permanent. The outline (Fig. 9) represents a foot disfigured in this way; it was drawn from nature, and with the exception of this distortion, is perfectly sound; it is the foot of a comparatively young woman. Figure 10 exhibits the outline of this sole laid over the sole of a corresponding shoe; whilst Figure 11 represents the skeleton of a foot reduced to this condition.

Very frequently, however, the toes cannot find place side by side, but, cramped for room, are *pushed over one another*, and this position gradually becomes *habitual*. Figures 12 and 13, taken from otherwise perfectly sound feet, are ex-

* The terms *outwards* and *inwards*, here and throughout, when used in reference to the foot, have relation to the middle line of the *body*, and not to that of the foot.

amples of this. The second toe is here pressed upwards above the great toe, and is thus only partially seen in looking at the sole of the foot. But we also occasionally find one of the other toes displaced, and I have frequently observed the small toe lying transversely across the backs of the others.

In both cases it very constantly happens that, in addition, one or more of the smaller toes are compelled to lie bent up, so that the first joint resembles a knob. *This defect also becomes permanent.*

It is clear that all these evils must become much greater if, in addition to its otherwise unsuitable shape, the shoe is made too short, since in this case the point of the great toe receives an additional backward pressure, which forces it still more against the smaller toes, and displaces its root still further inward.

Such very marked distortions as are represented in the figures above are certainly not very frequent, yet they occur much oftener than we should expect. That even apparently healthy feet are not quite free from traces of these deformities is exemplified by Fig. 14, which at the first glance seems to be perfectly sound; on trying to draw on it the line seen in Figs. 3 and 4, we shall discover however, that even here the great toe is directed obliquely outwards.

HOW THE SHOE GETS TRODDEN ON ONE SIDE.

The first consequence of the existence of such an unnatural relation between the sole of the shoe and the sole of the foot, is that the foot, especially while on the ground in walking and standing, exerts a counter pressure on its covering. The upper leather is to a certain extent compelled to take the natural form of the foot.

With dry and hard upper leathers this modelling process is slow and gradual, but with flexible materials the change takes place rapidly. Aware of this, we never put on our best shoes in rainy weather, because they would very soon lose all pretensions to elegance by acquiring the form of the foot, which as we have seen is very different from the shape of a fashionable shoe.

Since, then, the structure of the foot is such that the point of the great toe, the middle of its root, and the central point of the heel, lie in one straight line, it is natural that the upper leather should assume a shape in which the reciprocal relation of these three points can be maintained; and this shape is actually obtained in one of the two following ways:—

Either the *point of the great toe* pushes itself into a continuation of the line which can be drawn through the centre of the heel and its own root, and in this case the upper leather is pressed over the *inner edge of the front of the sole*.

Or (and this is more usual) the *heel* moves its centre into the line which can be drawn through the length of the great toe, and then the upper leather is forced over the *inner edge of the heel*.

In either case the shoes are said to be trodden on one side; and about this we grumble, while in truth this *treading on one side* is in reality a treading straight, the result of a victory gained by ill-used nature over unnatural constraint.

These two methods of treading on one side are the only examples of it which occur in walking with sound and properly formed feet; and hence they are fre-

quently met with. That wearing down of the *posterior* edge of the heel which is so common, is caused, not by treading on one side, but by *putting the heel to the ground first*.

ON THE PREVENTION OF TREADING ON ONE SIDE BY CHANGING THE SHOE FROM ONE FOOT TO THE OTHER.

Some recommend, with a view to the prevention of treading on one side, especially in the case of children, whose feet, retaining their normal form, readily twist their shoes about, that there should be a frequent change of shoes from the right foot to the left, and *vice versa*; and certainly the disfigurement of the shoe by treading to one side, is thus prevented.

The foot has now, however, assigned to it the very serious task of treading the shoe to *both* sides, for it is clear that it is continually being opposed to the powerful pressure of the upper leather, which at every moment is being forced into another shape.

The changing of the shoe from one foot to another is thus one of the most *baneful abuses* to which a foot can possibly be subjected; and in the case of children (to whom these remarks only apply) with feet, the development of which is still *incomplete*, the influence must be *doubly injurious*.

HOW AN IMPROPER FORM OF SOLE INJURES THE FOOT.

The consequences resulting to the foot itself from an improper form of sole, are not limited to the fact that the deformity becomes permanent, but are of a still more serious and important nature.

These more important evils are caused partly by the pressure to which the toes are exposed, and partly by the *bad usage* to which the distorted foot is necessarily subjected in walking.

The pressure of the upper leather first affects the small toe, and pushes it from before backward, bending it up on itself, and in this position it has not only to sustain the pressure of the upper leather generally, but also the pressure of the great transverse wrinkle which forms on it at the roots of the toes. Besides, as joints are exceedingly sensitive to external forces, it naturally happens that the joints of this toe frequently become subject to inflammation, giving rise to much pain and difficulty in *making use* of the foot, and at last leading to ankylosis (union of the bones forming the joint). The damage thus done to the *efficiency of the foot* is indeed not only very important, but before this point is reached much suffering must be endured, and we ought not, unnecessarily, to bring on ourselves any mutilation, be it ever so slight.

It is on the *great toe*, however, that by far the greatest and most *serious evil* is produced by an *improper form of shoe*, and the influence is first felt on those two points which primarily receive the pressure or its immediate consequences, *i.e.*, on the *point* and *root*.

At the point of the great toe the pressure falls in the first instance on the *nail*, and on it therefore its greatest effects are experienced. This pressure principally affects the anterior part of the *inner edge* of the nail, and must since it forces this part outwards (towards the smaller toes), displace the whole nail from its

natural position. It first becomes oblique in its direction, and is then forced over the margin of the skin which ought to cover it on the side next the small toes, and thus slight inflammations (Fig. 16, *a*) are constantly excited in the displaced fold of skin, giving rise to more or less pain.

At the same time the matrix of the nail fixed under the skin (Figs. 15 and 16, *b*) is forced more firmly into the skin, whilst exactly on the point into which it is so pressed, there is constant pressure of the upper leather from above, and the nail can thus only be disposed of by being rolled up on itself. This pressure, moreover, acts on the whole inner margin of the nail, which must therefore also be rolled up on itself. The whole inner margin is in this way bent downwards and in consequence of such distortion, the skin, in standing and walking, is continually pressing against the sharp edge of the nail and is thus kept in a state of constant irritation. As the evil proceeds, the margin of the nail passes more and more round, and presses more sharply into the skin, until it reaches that state in which it becomes painful whenever a shoe is put on, because not only is the nail now driven into the skin by the pressure from under, in walking and standing, but precisely the same effect is brought about by the pressure of the upper leather, even when the foot is hanging quite free.

In this manner the skin which is contiguous to the bent-up margin of the nail is always irritated and painful, especially after prolonged walking; by degrees it gets into a state of chronic inflammation, and may eventually become ulcerated, producing what is popularly known as "proud flesh." We have in figure 18 a "*growing-in nail*," an ailment which not only interferes greatly with the use of the foot, but too often requires for its relief medical and even operative interference.

Not less important are the evils arising at the *root* of the *great toe* from the same cause. It has already been stated that the pressure of the upper leather *pushes the point of the great toe against the smaller toes*. The joint at the metatarsal bone thus becomes *bent aside* (Fig. 11), so that it forms a *protuberance* on the inner side of the foot. If the point of the toe is now pressed against the ground in walking, this protuberance must be made *still greater*, and so pressed more forcibly against the *upper leather*. At the same time, moreover, the great transverse wrinkle in the upper leather—the result of the bending of the toes—presses directly on the same point; and the protuberance at the root of the toe is thus constantly subjected to a *twofold* and very injurious pressure. In these circumstances it is by no means wonderful that this joint becomes subject to *continual inflammation*, which, by *extending to the bones*, must, in this situation, produce permanent and painful swellings, which become in their turn, and even from slight causes, the source of inflammations and *new growths of bone*.

In this manner arise those *unseemly and painful swellings at the root of the great toe*, which, either from mistaking their *true nature* or from wilful deception, are called *chilblains* or *gout*, just as the one or the other term appears the more interesting. In many cases, moreover, this kind of inflammation of the bones, and their investing membrane, may lead to the formation of matter, and eventually to the disease known as *caries* or ulceration of the bone. Fig. 19. *

* In connection with this I wish to explain, that I by no means desire to question the existence of such inflammation of this joint as are commonly attributed to gout; in by far the great-

Such are the principal injuries to the foot resulting from the pressure of ill-constructed shoes, and they are of sufficient importance to induce me to confine my remarks to them alone. I shall therefore only very briefly allude to the constant irritation which the pressure of such a shoe occasions to the skin, giving rise to the proverbially sensitive *corns*, and to those painful thickenings of the skin usually known as *bunions*.

I must, however, explain at somewhat greater length how the improper form of the shoe becomes one of the chief causes of *flat-foot*.

Flat-foot is occasioned by the *loosening of the ligaments that knit the foot firmly together, and by the consequent sinking of the arch*, the inner aspect of the foot no longer presents the *natural hollow* in the sole. The *causes* of such loosening of the ligaments are numerous; but by far the most frequent, and one readily induced by the ordinary shoe, is *weight improperly directed on the arch*. If, for example, a shoe happens to be trodden on one side, and especially, as is most commonly the case, if it be so at the heel, then the heel has no support except from the inner margin of the *sole*, which is thus worn away, and the *heel-piece becomes oblique*, or, in other words, lower at one side than the other. In walking and standing on such a heel-piece, the whole *external margin of the foot is raised*, and the *inner*, which naturally supports the arch, is so *depressed* as gradually to lose its convexity; and thus *flat-foot is induced*.

Growing-in nails, unseemly protuberances at the base of the great toe (*gout*, *chilblains*,) *corns*, *bunions* and *flat-foot*, are thus the immediate consequences of that unsuitable form of the shoe in established use.

HOW THE SHOEMAKER, WITH THE BEST INTENTIONS, RENDERS STILL WORSE THE CONDITION OF THE DISFIGURED FOOT.

When about to make a shoe for a foot *already crippled*, the shoemaker believes that he succeeds perfectly if he makes it *exactly to fit the foot*. This, however, is a *gross fallacy*; by so doing he renders the *existing evils* still greater.

A foot with its great toe lying *obliquely* is necessarily *shorter* than it would be with the toe in its proper position, and if the shoemaker calculates the length of the sole by that of the measured length of the foot, he makes the *shoe too short*. In such a shoe there is no possibility of the great toe ever *attaining its true position*; on the contrary, it is still more *firmly fixed* in its false direction, and all the consequent evils are thus *intensified*.

In order that the shoe may not pinch, the shoemaker is also in the habit, with the very best intentions, of making the upper leather *very roomy towards the inside opposite the projecting ball of the great toe*. This expedient, however, as will readily be perceived, has the great disadvantage of affording still *greater facility* for the *further displacement* of the root of the great toe.

Thus when the shoemaker flatters himself that he has made a very comfortable and particularly *good fit*, it turns out that he has actually *increased the disorder* number of cases, however, inflammation of the metatarsal-phalangeal joint of the great toe is traumatic, as above described; and even with regard to the occurrence of *gouty inflammations* the causes above alluded to give an obvious reason for the formation, at the points indicated, of a *locus minoris resistentiæ*.

torting pressure on the great toe, and thus favored the exciting cause of the whole mischief.

ON VERY BROAD SHOES, AND ON TAKING MEASURES BY MEANS OF AN OUTLINE OF THE FOOT.

Numerous examples have already shown us that the ordinary covering of the foot has many disadvantages ; many attempts have accordingly been made to overcome these evils in one of these two ways :—

1. By making the shoe very broad ;
2. By taking measure by means of drawing the outline of the foot on a sheet of paper.

Both methods are quite *insufficient*, as may readily be proved.

The results arising from a very broad shoe, in which, in addition to a correspondingly wide upper-leather, the sole is made unusually broad in front, can only be clearly understood by reference to Fig. 20. In this we have a straight sole without any pointing before ; but even with a sole of this kind the great toe cannot find a place in its true position, that is to say, in the line *a b*. It still remains pressed obliquely outwards, passing indeed in the line *c d*. Shoes of such a breadth of sole, which according to the current belief are faultless, are doubtless better, but are scarcely more suited to their purpose than shoes of ordinary make. (Compare Figure 7, in which the line *c d* is likewise drawn, showing the position given to the great toe in the shoe.)

The second method, that of measuring the foot by drawing its outline on a sheet of paper, is especially clear to the shoemaker's mind, because his employer, by instructions given beforehand, has completely cut himself off from all ground of complaint. "The shoe is made exactly to the foot," says the shoemaker, and his victim also readily consoles himself with this reflection, and attributes his long-endured infirmity of feet to every cause but the right one. In this expedient there is also, however, much *deception*, the very foundation on which it rests being quite *untenable*. It proceeds on the principle that there are *primary differences* in the structure of feet ; this is an *error*. *All feet are perfectly alike in the principles of their mechanical construction*, and the only differences in our healthy feet are those arising from *varying length or breadth*. In the *original form* of the foot we never meet with those *essential differences*, designated by shoemakers *straight or bent feet*, and still less with such variations as arise from the position in which the *great toe lies*, or from the thickness of the *ball* at its root. Variations of the latter description only indicate how far the form of the foot has passed towards the shape of the shoe ; in other words, to what extent the foot has become *deformed by shoes worn at a former period*.

For healthy feet, therefore, a *drawing is superfluous* ; it is sufficient to have the length and breadth, and—most important of all—a *knowledge of the structure of the healthy foot*. To the management of feet already distorted I shall return hereafter.

The true form of the foot, moreover, is never attained by such a drawing. It

is usually taken from a foot enveloped in a tightly fitting stocking, and in this case the direction of the great toe is always oblique, because, from the constant pressure of the shoe, this obliquity comes to be assumed so readily, that the very moderate force exerted by a stocking is quite sufficient to bring it about. The foot is consequently drawn with the toes **UNNATURALLY PRESSED TOGETHER**. A drawing taken from the nude, with a knowledge of the anatomy of the foot, is the *only one* that will give the *correct* form of the sole of any foot.

But while a drawing of the naked foot is unnecessary, it might still be of some advantage, and might be used to some purpose by a shoemaker who knows and is willing to apply the true principles on which a sole ought to be constructed, for it would do away with the necessity of sundry individual measurements, and give him exact copies of minor defects which must always be taken into consideration in the construction of the shoe. Most shoemakers, however, use such drawings in order to find out how they will be able most conveniently to **SQUEEZE** the foot into the smallest possible compass ; and as long as the shoemaker persists in this endeavor, as long as he recognizes as his chief aim the symmetrical squeezing of a foot round the axis of its sole, so long will the most exact copy of a sole afford no guarantee to the employer that he will get a more comfortable or even a better fitting shoe than that in ordinary use.

The supposed advantages of these drawings rest then, in a great measure, on a delusion ; and no less deceptive is the idea that a shoe with a broad sole *must* fit, simply because the sole is *broad*.

HOW A PROPER SOLE MAY BE DESIGNED FOR EITHER FOOT.

After what has been stated concerning the structure of the foot, and the evils arising from an improperly shaped sole, the principles on which a proper one ought to be constructed may be arrived at without difficulty.

The main point to be attended to is, that the *great toe shall have its normal position*, so that those functions which are proper to it may be called into play in walking. It must, therefore, as has already been pointed out, lie in such a position as that its axis, when carried backwards, shall pass through the centre of the heel. In a straight line, therefore, in which the centre of the heel and the axis of the great toe are included, we have the primary line necessary to designing the entire sole, and a proper sole may now be formed in the following manner :—

The length of the foot from the back of the heel to the point of the great toe is laid down in a straight line, *a b*, Fig. 21. The half of the breadth of the heel *c d*, should then be marked off on this line, and the centre of the heel is thus ascertained. The length from the point of the great toe to the point where the hollow of the foot commences, that is to say, to the posterior margin of the ball of the great toe (*e f*), about two-fifths of the whole length of the foot, is now to be measured and marked off in its proper place on the primary straight line, and thus the broadest part of the foot is found. At this place a line should be drawn cutting the longitudinal straight line at right angles, and on this transverse line the greatest breadth of the foot is to be marked, so that just so much of the foot

lies on one side of the long line as corresponds to half of the breadth of the great toe (*f g*), the rest of the whole breadth of foot falling on the other side (*f h*.) The longitudinal line is now carried a little farther forward, and then *parallel to it* the inner margin (*g i*) of the anterior sole is to be drawn, and for this purpose we begin at the inner termination of the transverse line which indicates the greatest breadth of the foot.

All the points essential to the construction of a proper sole have thus been obtained, namely, the inner margin of the anterior sole, the posterior boundary of the heel, and the greatest projection of the little toe. Around these points a sole may readily be constructed, as may be seen from the drawing (Fig. 21,) in which the outlines of the sole are filled up with dotted lines. To a shoemaker of good taste, it will not be at all difficult to put into the design a *certain amount of elegance*. By way of example I submit (Figure 22,) the outline of a sole designed from the points just indicated by Mr. Weber, a shoemaker in Zurich; and in order to show the difference between a sole of this kind and one of the usual construction, I add the outline of one of the latter description (Fig. 23,) which was cut out by the same *artiste* for the same foot, the deviations of the proper sole being distinguished by dotted lines.

In designing a sole, a drawing of the sole of the foot may be very useful to a shoemaker who *knows and is willing to apply the true principles of his art*, as he will thereby be saved the trouble of taking numerous individual measurements.

To recapitulate what we have already said: A sole is of the proper construction when a line (see Fig. 22 *c d*,) drawn at half the breadth of the great toe distant from, and parallel to, the inner margin of that toe, shall, when carried backwards, pass through the centre of the heel. In the usual form of a sole this line passes out of the inner margin of the heel (see Fig. 7.) If, then, the preservation of the primary straight line is, as has been already shown, the principal point in the formation of a proper sole, it follows, that if it be thought desirable to have pointed shoes, *the pointing must be effected from the outer side*, as indicated in Figure 24.

In a pair of shoes made on these principles, placed side by side with the heels in contact, the inner margins of the front part of the foot are also brought close together. (Fig. 25.)

HOW SOLES ARE TO BE CONSTRUCTED FOR FEET IN WHICH THE GREAT TOE HAS ALREADY BEEN PRESSED OBLIQUELY OUTWARDS.

We have just seen how the sole should be constructed for feet *not very decidedly distorted* by the ordinary form of sole, that is, in those cases in which in the naked foot the great toe still *readily assumes its proper direction*. The question now arises, How is this to be done for feet in which, when naked, the toe *retains a false direction*?

The answer is simple: The sole ought to be cut exactly as if the great toe were in its *proper position*. The grounds for this conclusion are clear. For, if the sole be made to suit the foot, the ordinary shape is simply *reproduced*, since

the deformity has *arisen precisely through the foot accomodating itself* to the shape of the shoe. The *continuation* of the injurious effects would thus be insured, and they might perhaps even be *increased*. If, on the other hand, the sole be made of the proper shape, it becomes possible for the great toe to *assume its normal position*, and thus restore the foot to its *true form*. When the projection at the root of the great toe is already considerable, the *breadth* of the shoe might even be somewhat *lessened* at this point, in order that a gentle pressure on this region might support the great toe in its *change* in the *right direction*.

Whether, and how far, this expedient might be advisable in very well marked distortions and swellings ought, in every individual case, to be decided by an *experienced surgeon*.

I must now explain more particularly how the sole is to be construed in such a case of permanent obliquity of the great toe, because a certain point must here be carefully attended to.

That is to say, the *length of the foot is not to be taken in one measurement*, for if so taken, the sole will be inevitably too short, but it must be taken in *two parts*, the first being the length from the *heel to the joint at the root of the great toe*, and the second the length from this *joint to the point of the great toe*. These two measurements must then be added to each other and laid down in a straight line, and the result will be the *primary longitudinal line of the foot*, which is employed in the further modelling of the sole exactly as directed in the previous section. Suppose, for example, that the sole of the foot for which a shoe is to be made has the form of Figure 26, the length *b a* is to be measured first, and then that of *a e*; the latter should then be carried out in continuation (*a d*) of the line *b a* which will now extend to *e*, and *b e* will then represent the true length of the foot in question.

ARE HIGH HEELS OF ANY USE?

It is usual in all shoes of even moderate strength to make the heel a little higher by means of what is called a *heel-piece*.

These heel-pieces are generally of some little use, especially in dirty weather, and we cannot wholly deny their right to existence. But, at the same time, they ought to be as low as possible, and heels an inch thick, as is at present very commonly the case, have very serious disadvantages indeed.

The weight of the body is by this means thrown in a disproportionate ratio on the toes, the joints of which are consequently overstrained. Moreover, with a high heel the sole is so oblique in its direction that the foot must constantly be gliding forwards and forcibly pressing the toes into the point of the shoe. The toes, therefore, even when the shoe is sufficiently long, are subjected to the same injuries and disfigurations as if it were too short, and the effects are doubly hurtful, when the form of the sole is also incorrect.

High heels, especially if they are also very small, are peculiarly liable to wear obliquely, and so the shoe gets trodden on one side; they must therefore be peculiarly favorable to the origin of flat-foot.

High and small heels are therefore quite unsuitable. The heel-piece ought to be as low and broad as possible.

THE UPPER LEATHER—BOOTS OR SHOES?

With regard to the upper leather, there is on the whole little to be said, since its shape is in a great measure determined by that of the *sole*, so that with a properly constructed sole the upper leather must also be essentially correct. It need only be observed, that the material should be as pliant as possible, and that it is well adapted to its purpose, when sufficient width is allowed over the toes to enable them to move freely in walking and without constant pressure being exerted on their first joints.

[Especial care must therefore be taken to have the upper leather so wide at the inner margin of the foot as to admit of the great toe resuming its natural position, which is now made possible by the shape of the sole.*]

We now come to another important question, namely, where and how is the fastening of the shoe, or boot, to be effected?

Very light low shoes, such as dancing shoes and slippers, the upper leathers of which are alone sufficient to keep them firmly on the foot, do no harm by the mode of their fastenings, but it is insufficient, and a more efficient contrivance is required for the ordinary boot or shoe.

The boot is fastened by firmly encircling the foot at the instep. The whole foot is so wedged in between upper leather and sole, that, as is well known, the pulling off of a boot very frequently necessitates the use of a boot-jack.

It is impossible that the foot can be thus tightly clasped without producing a constant pressure on the instep. What then are the consequences of this?

We have already seen that the foot forms an arch, the efficiency of which in a special manner depends on the *tensity of its ligaments being maintained*. If, then, an unnatural and *flattening pressure* be constantly exercised on this arch, the *binding ligaments* get slackened and the arch falls down; and a *broken-down arch*, as we have already seen, causes flat-foot. The pressure of the upper leather on the *instep* must therefore, and particularly in the case of narrow boots, favor the origin of this deformity. The same cause must further interfere with locomotion, for at every step the increased arching of the instep, which takes place the moment that the foot is set to the ground, is resisted by the upper leather, and an injurious influence is thus exercised on the action of some of the muscles used in walking, and which run from the anterior aspect of the lower leg to the back of the foot.

A boot is thus by the nature of its fastenings rendered a very unsuitable covering for the foot. When we consider, then, how very generally boots are worn, and worn, as a rule, with very high, small heels and badly-shaped soles, we need feel no surprise that flat-foot, bent-up toes, "chilblains," grown-in nalls, corns, bunions, etc., are so common.

* This sentence is not in the original, and is here inserted by desire of the author.

Notwithstanding this fault on the part of boots, we must bear in mind that this kind of covering is almost indispensable for wading through water and walking in snow. Only let care be always taken that boots made for such purposes be *not too closely fitting over the instep*.

Shoes or half-boots, in which the fastening is effected by means of *laces*, are better than boots, inasmuch as a lace can never be pulled so tight as the upper leather may be, for it often takes the whole strength and weight of a man's body to enable him to squeeze his foot into a boot.

The best kind of fastening, however, is that which is carried somewhat above the ankles, especially if it be possessed of a certain amount of elasticity. The fastenings of half-boots, by means of pieces of elastic let into them, are therefore very suitable when not too tight. With such a fastening the arch of the foot is in no way impeded in its action, and the movements of walking are thus effected in the easiest and most unconstrained manner possible.

[It must, however, by no means be inferred, that the upper leather should not fit the foot with accuracy. It is absolutely necessary, indeed, that it should do so for the protection of the toes in going down hill. And what has just been said must only be considered as a warning against the *too* tight, and consequently hurtful, closing so common in boots.*]

ANSWERS TO OBJECTIONS.

Various objections will doubtless be made to the kind of sole proposed in these pages, and the curved form will be especially found fault with, for it will be said that one cannot be elegantly *chausse* in such shoes.

Objections of this kind indeed have been already suggested.

To such remarks I have to reply, that the objector must first define his notion of the word *elegant*.

One set of people consider *elegant* and *fashionable* as equivalents. I need only remind these, that *Fashion* has already had *many changes*, and that she brings about new ones every day. It is perfectly possible, then, that she may one day take up the proposed form, and from that moment it will become elegant. A shape may come into fashion—and be thought elegant too—provided only a considerable number of persons *approve of and adopt it*.

Others say such a shoe cannot be elegant, because the feet appear to be too **much** turned inwards. This idea is a pure hallucination : the proposed form of shoe admits of the foot having its own proper shape, while in reality the ordinary form frequently renders the actual *turning in of the foot quite necessary* for the relief of pain experienced at the root of the great toe.

Others again, taking their stand on a *sense of the beautiful*, declare the curved sole anything but beautiful, and therefore inelegant. I would only ask such people if they consider a *naturally-formed foot less beautiful than a crippled one*, and if they consider a shoe that always sits well less agreeable to look at than one *trod*den to one side.

* This paragraph also is added in this translation at the request of the author.

Another set object to it as being too conspicuous. To these I can only say, that anything will cease to be *conspicuous* when it comes into *general use*. The proposed form, however, is not after all so very remarkable in appearance, several persons having already adopted it without attracting undue attention. On the other hand, a crippled foot *is* conspicuous, and very unpleasantly conspicuous too.

But even if the proposed form of shoe be somewhat peculiar, as a set-off it has the advantage of always sitting well, of affording the greatest possible comfort in walking, of keeping the foot in good shape and condition, and even of *giving a chance of recovery to an already injured foot*. And in deciding for or against it, these advantages must, among other things, be taken into account.

EXPLANATION OF WOOD CUTS.

FIG.

1. Bony framework of a healthy foot, seen from above,—*a a*, metatarsal bones,—*b*, astragalus,—*c c*, phalanges of toes,—*d d*, the tarsus of which the astragalus forms a part.
2. The inner aspect of the foot, showing the arched construction of the whole foot,—*a*, head of metatarsal bone of great toe,—*b*, calcaneum,—*c*, astragalus.
3. View of a sole as yet in its natural state.
4. Sole of the foot of a child two years old.
(In both of these Figures (3 and 4) the continuation of the axis of the great toe is seen to pass through the centre of the heel.)
5. A symmetrical (straight) sole, like those usually made for ladies' shoes.
6. A sole of the same kind for a man's foot.
7. An unsymmetrical sole (made to fit one foot only) of the ordinary make,—*c d*, the line in which the axis of the great toe lies in a sole of this kind.
8. The two outlines (Figs. 6 and 7) laid on one another, showing that the only difference between these two soles is in the direction of the "*waist*" between the heel and the anterior part of the foot.
9. Sole of the foot of a girl twenty-two years old, distorted by the pressure of the shoe, but otherwise healthy.
10. The same sole with the outline of a *straight* sole laid over it, showing how such distortions are produced by the form of the foot accommodating itself to that of the shoe.
11. View of the skeleton of a foot so deformed, from above. The joints of the toes look shorter here than in the healthy foot (Fig. 1,) because, on account of the toes being curved, they are apparently diminished in length.
12. Sole of a woman about twenty; the second toe is pressed upwards and is therefore not visible.
13. Sole of the foot of a girl somewhat younger; the second toe is not seen here either, and the rest of the toes are also pressed into an opposite and wrong direction.
14. Apparently healthy sole of a young man nineteen years of age, in which, however, a false direction of the great toe may be observed.

Note.—The two Figures 12 and 13, as well as Figures 3 and 9, I owe to Dr. Albrecht Claus, who was kind enough to sketch them from bodies lately coming before him as anatomical subjects; I have to thank the same gentleman for the drawings of Figures 4 and 14. It would have been easy to increase very considerably the number and varieties of examples of deformities.

FIG.

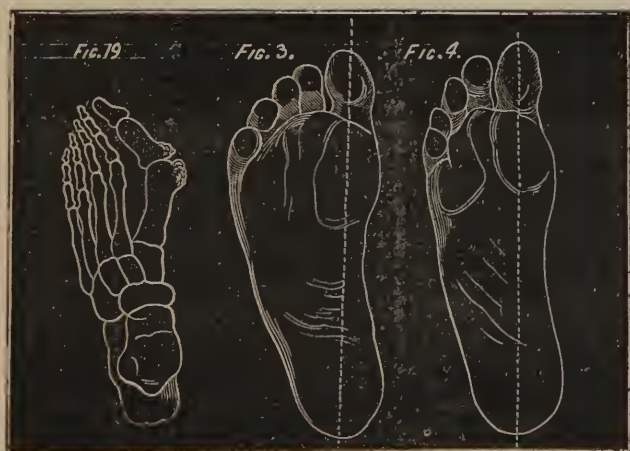
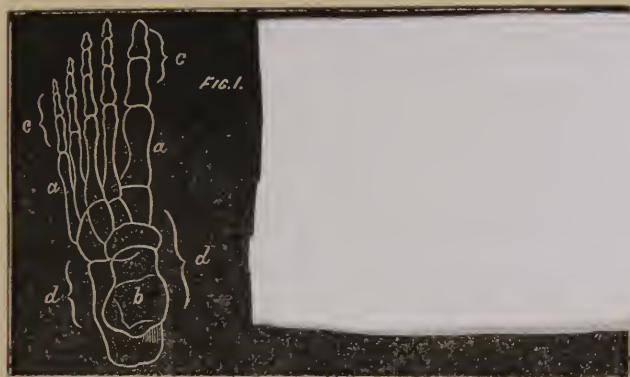
15. The nail of the great toe in its healthy state. The dotted line shows the extent to which the nail is connected under the skin.
16. The nail of the great toe pushed obliquely on one side,—*a*, inflamed margin of the fold of skin pressed outwards,—*b* in this and the immediately preceding Figure is explained in the text.
17. Transverse section through the distal phalanx of the great toe with a healthy nail.
18. Transverse section of the anterior joint of the great toe with the outer edge of the nail bent up, ("growing-in nail.")
19. Bones of a foot in which the joint at the root of the great toe is very much distorted inwards, inflammatory exudations forming bony prominences are also apparent; seen from above.
20. Sole of a shoe unusually broad in the fore part, showing that in a sole of this kind also the great toe has a false position, that is to say, in *c d* instead of *a b*.
21. Design for the construction of a proper sole. Explanation in text.
22. The proper sole for a shoe, indicating the line in which the great toe lies, *c d*. The line marked *a b* is that round which the shoe is constructed in the usual method. (Compare Figures 5, 6, and 7.)
23. The proper sole (Fig, 22) laid, for the sake of comparison, on the symmetrical sole of the ordinary shape (Fig. 7.)
24. The proper sole pointed at the toes.
25. Right and left soles of the proper construction placed side by side.
26. Method of constructing the proper kind of soles in cases where the great toe has been pressed obliquely out of its true position. Description in text.

ERRATA.

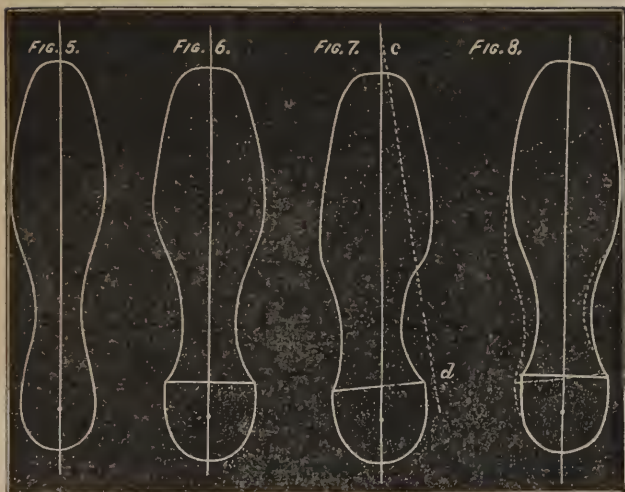
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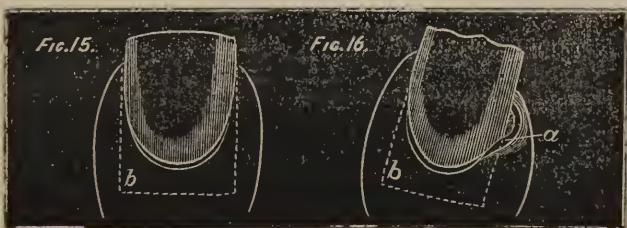
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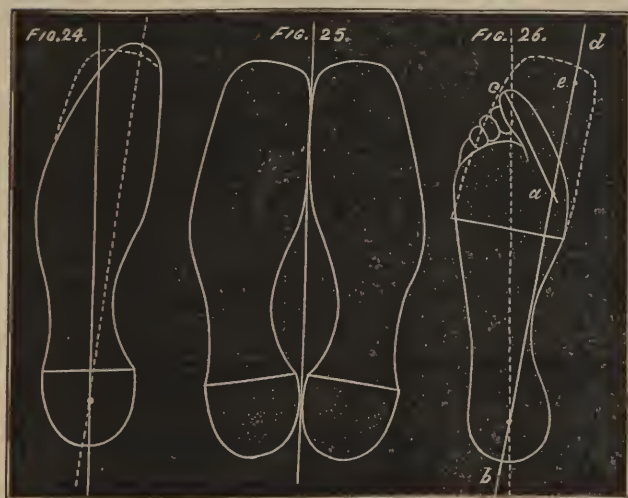
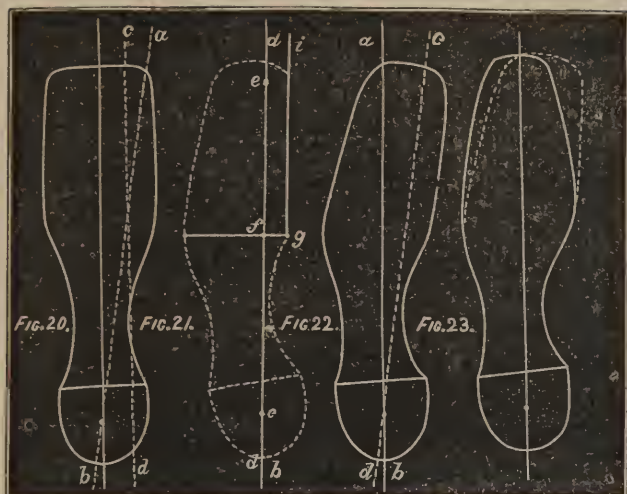
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IMPROVED LASTS
FOR
BOOTS AND SHOES;

Patented July 17. 1860.

By J. C. PLUMER, M. D., PORTLAND, MAINE.

Selections from the Specifications.

"This invention has for its object the construction of Lasts for Boots and Shoes in a novel manner, and in such a way that the entire bottom of the Last will correspond to the *bony and ligamentous* structure and conformation of sole, back, and heel of the natural or normal foot, so that a shoe produced upon such a Last will prevent distortions and deformities of the foot or joints of the foot, callosities upon the toes, etc., and *relieve and correct* them where they already exist.

"The invention provides for pressing the plantar tissues or cushion of the hollow portion or groove in the arch of the foot, against the metatarsus, causing a separating or spreading effect laterally upon it, thereby preventing compression of the anterior tarsal, metatarsal, or phalangeal bones. It also provides for affording a constricting support around and longitudinally to the arch and sides of the foot, at or under the astragalo and calaneo-tarsal articulation, or union of the bones of the heel with those of the arch of the foot.

"It also provides, by the curved form of the bottom and back part of the heel of the last,—for an *advanced position* of the heel of the last, or *heel seat* of the last,—whereby the position of the boot heel is advanced nearer to the front part of the foot, the *shank of the boot is shortened*, and the point of support brought more directly under the line of the tibia, or bone of the leg, rendering a stiff, uncomfortable shank unnecessary.

"The shape of the lasts that are at present made, produce in boots or shoes made on them, curves, elevations, and depressions that are contrary or antagonistic to the natural conformation of the bony and ligamentous structure of the sole of the foot, which have a decided tendency to deform the foot, and the results are manifested by the deformities, distortions, callosities, &c., that result from this malformation of the soles of boots and shoes that are at present worn. The surface of the inner sole is made concave where it should be convex, the heel seat, if there be any, is thrown back too far from the ball portion of the sole, and consequently the axis of the body is brought nearer to the articulation or joint of the anterior with the posterior portions of the tarsal bones, and the weight of the body over this point dislocates or stretches the bony and ligamentous structure of the arch of the foot, and the chord of the arch is distended and the foot necessarily flattened, and its natural shape and functions seriously injured.

"This invention is intended to obviate these objections, and it consists firstly in making the under surface or sole of the last, laterally concave from the *front* of the *heel* to the *toe* of the last.

"It further consists in curving the heel portion of the last in such a manner, that a rotundity will be formed corresponding to the posterior extremity of the os-calcis or heel bone, with its ligamentous attachments, which will give the heel an advanced position, diminish the length of the shank, and bring the point of support nearer to the line with the axis of the tibia and fibula, or bones of the leg, affording ease and giving antero-posterior support to the heel of the foot, and supporting the foot to a great extent at the astragalo and calcaneo-tarsal articulation, as will be hereinafter described and represented.

"It further consists in combination with the advanced heel seat in constricting laterally, that portion of the last in the middle of the arch, corresponding to the fleshy portion surrounding the astragalo and calcaneo-tarsal articulation, making it conform and adapting it to this part so as to give a uniform pressure upwards and bi-laterally, as will be hereinafter described and represented."

TESTIMONIALS.

STATE ASSAYER'S OFFICE, }
Portland, June 15, 1860. }

TO DR. J. PLUMER:

My Dear Sir:—Several months since, while in the pursuit of my official duties, I had occasion to call at your office. While there, my attention was attracted to sundry diagrams which I saw, and on inquiring their meaning, you explained them, and developed to my understanding an invention of great novelty, and which promised to confer a boon long sought after, but until this never discovered. This was no other than the Last as modified and improved by you, in accordance with an eminently philosophical principle. And when I came to comprehend the invention, it commended itself to my judgment as the only correct plan for the construction of a last, and the making of boots and shoes upon it. So thoroughly confident was I of its entire correctness, that I at once ordered a pair of lasts to be made upon the plan, as designed by you. And without awaiting the result of the experiment, I had my wife and her sister measured also for a pair of lasts each, making three several pairs. The shoes made upon these lasts were eminently satisfactory. In my own case they were worn with entire ease and comfort, during a recent journey to Washington, and during my stay there and at Baltimore, I walked several miles a day with less fatigue than I ever remember having experienced on walks of similar lengths lengths before. My wife wore her boots with the greatest comfort, and on temporarily returning to the old style of ladies' boots, was astonished at the difference she found between the new and the old. Her sister, who had always been obliged to buy shoes several sizes too long in order to get those she could wear, at length got a boot which fitted her foot, and reduced it to genteel dimensions.

In summing up the advantages of the last, or the shoes or boots made upon it, the following appear to me, evident from my own experience and observation :

1. An accurate and easy fit.
2. The lines of the last conforming to those bounding the skeleton of a well formed foot, must prevent deformities and appreciably correct them when present.
3. The natural arches of the foot are properly supported, and their development is favored so as to produce a firm and elastic tread.
4. The heel being provided with a hollow seat, where it is firmly set, the foot has not a tendency to slide forward in the shoe or boot, producing pressure upon the nail of the great toe, and a liability to the painful disease known as "growing nail."
5. No doubt exists in my own mind that some forms of lameness, dependent upon abnormal tension of the ligaments and tissues in the tarsal arch may be effectually relieved by wearing shoes made upon the last as improved by you.

And further experience will no doubt develop further advantages.

In conclusion I would say, that I have reason to believe that the principle suggested to your mind and followed out by careful and patient reasoning and experiment has now for the first time, been PRACTICALLY and FULLY DEVELOPED and APPLIED. It consists, as I understand, in conforming the outline of the last to the contour of the osseous ligamentous tissues of a well formed and developed foot, bringing the point of support more directly in the long axis of the body and limbs, diminishing the amount of leather employed in a shoe to the minimum necessary, and conferring advantages which can be most sensibly appreciated by those who suffer from tender feet.

That you may reap an abundant reward for your careful study and ingenuity is my earnest wish.

Yours very cordially,

H. T. CUMMINGS, M. D.,

Assayer to the State of Maine.

PORTLAND, June 15, 1860.

MR. D. ROBINSON, JR. :

I have worn with great satisfaction and comfort, the boots furnished by you, and made upon the "Patent Last." They were more comfortable to my feet the *first time I put them on*, than a nice pair of boots, made upon the common form of last, which I have been wearing for several months.

It seems to me that the invention of Dr. Plumer is as valuable as it is novel. Based upon principles entirely scientific, and applied in a manner quite original, I think his services to the public should be highly appreciated and in some way handsomely rewarded.

Very truly yours,

ISRAEL T. DANA, M. D.

PORTLAND, Nov. 24, 1860.

DR. C. PLUMER,

Dear Sir :—I have been perusing your little book upon the "Mechanics' Me-

chanical Anatomy, and Mechanical Distortions of the Bony Structure of the Human Foot." By the aid of such numerous and ingenious diagrams, you have made the exposition interesting, clear and conclusive.

I think you cannot fail to reach the *understandings* of the people.

You make your "Patent Last" do what the common last does not begin to do; viz. : *correspond to the natural contour of the solid structure of the foot*. Notwithstanding that my feet had so often *ached* in testimony to the fact that new boots even "made to order" upon the old last, would not fit, I would not have believed that the old form of last could be so faulty as the comparison of it with the new has demonstrated it to be.

The *principle* of the "Patent Last" commends itself wholly to my judgment, and I believe it to be as novel as it is excellent.

Boots and shoes made upon it are calculated to *preserve* the natural arches of the foot, upon which the facility of standing and walking largely depend, while the use of those made upon the old plan tends to *break them down*. I examined the foot of a gentleman yesterday, in whose case the arches had been thus destroyed, and who suffers greatly in consequence. He might have escaped this misfortune had your invention been made fifty years ago. It may do something now to correct the deformity.

It makes the wearing of *thick soles* comfortable to ladies, who have heretofore rejected them to the great detriment of their health.

Boots made upon your Last exert an *equable pressure* upon all parts of the foot, and so must tend to prevent the local congestions and tumefactions so common and so painful, and so often leading to results yet more unfortunate.

A personal *experience* has fully realized high expectations on my part, and such is the universal testimony I have heard from others.

Very truly yours,

ISRAEL T. DANA, M. D.

MR. D. ROBINSON, JR.,

Dear Sir :—I am happy to say that the boots made for me several weeks since at your establishment, on the "Patent Lasts" of Dr. Plumer, are the most comfortable I have ever worn.

Yours truly,

Portland, Oct. 5, 1860.

S. FITCH, M. D.

J. C. PLUMER, M. D.,

PORTLAND, Nov. 23, 1860.

Dear Sir :—It gives me pleasure to add my individual testimony to that of many friends and acquaintances, in regard to your "Patent Last."

Many inventions, which *theorize* beautifully, fall lamentably short in the *practical application*. This discovery is only exceeded in the breadth and strict truth of its scientific basis by the thoroughness and success of its practical application; and, indeed, as in the old legend of Columbus and the egg, we only wonder that nobody *did it before*.

It seems to me that a *fair trial* of this last is all that is necessary to convince

the most skeptical of its immeasurable superiority to everything in this line that has preceded it.

Truly yours,

CHAS. W. THOMAS, M. D.

PORTLAND, Me., Nov. 23, 1860.

Dear Doctor :

Thank you for your pamphlet on the "mechanics of the human foot." The diagrams are, in a great measure, new to me, and they are very beautiful and very truthful.

Anatomists have long admired the skeleton of the foot, and surgeons have carefully analyzed the principles of its construction and the relation of its parts in order, to remedy its frequent distortions and diseases induced by fashionable boots and shoes.

But the idea of conforming the Last to the solid structure of the foot upon the principles of exact science (unquestionably originated by yourself) is destined to revolutionize completely the art of boot making and elevate it, if not to the rank of the fine arts, at least to that of the finest decorative arts.]

The important changes you have instituted in the construction of the Last, are calculated not only to avert the evils named above, but by preserving the integrity of the arches of the foot will eminently develop its beauty, strength, elasticity—and these results will induce many to walk much in the open air, who seldom walked before, especially the ladies, and thus an important means of health will become attractive, interesting, fashionable, and consequently universal.

I have had another pair of boots made on the "Patent lasts," and I shall probably never again habitually wear any other kind.

I formerly remembered my Edinburgh shoes with which I walked over the Highlands of Scotland as most comfortable, and the boots made for me in Paris as very beautiful, but those made upon the "Patent Lasts" are alone perfect, and with sentiments of real gratitude for the benefits of your invention, I remain

Yours very truly,

S. FITCH, M. D.

Dr. J. C. PLUMER.

PORTLAND, Dec. 7, 1860.

Dear Doctor :

Permit me to give you my experience in the use of the "Patent Last." Since childhood I have suffered from weakness of the ankles, and flattening of the foot, much aggravated by a recent attack of rheumatism, that left the ligaments so sore as to render walking extremely painful, even in boots which I have worn so long as to fit them as perfectly to the feet as it is possible for boots made on the old last. In this condition I tried a pair of shoes constructed on the "Patent Last." I was able to walk in them with the utmost ease. The peculiar form of the sole and heel afforded that support to the plantar arch which it had always needed, and in a short time my feet were in a better condition than they had ever been before.

I most cordially and gratefully acknowledge the benefit which I have received

from their use, and shall take every possible occasion to recommend the "Patent Last" to all who, from any cause, find it difficult to get well fitting and easy boots, certain that, after a sufficient trial, they will agree with me in the belief that it is one of the most valuable and useful inventions of the times. I do not hesitate to predict that it will entirely supersede the use of the old last in no great length of time. Yours very truly,

W. R. RICHARDSON, M. D., *City Physician.*

J. C. PLUMER, M. D.

[*From the Portland Transcript, Jan. 26, '61*]

MR. EDITOR :—That you may grow cucumbers to a bottle, and oblige them to take the shape of the bottle, everybody knows or ought to know. That the human foot may be transformed in the same way, and be made to take upon itself any shape, according to the whim of a shoemaker, ought also to be known, and the sooner the better ; lest God's handy work be utterly spoiled by little and little, before the sufferers get their eyes open, or the *understandings* enlightened enough to see or feel the truth.

Having tried the new last of Dr. Plumer, and worn the boots long enough to be able to speak without any serious misgiving, allow me to say, as a matter of duty, and of my own free will, without solicitation, that I look upon the invention as among the most truly scientific and comfortable, and promising of our age. Of course improvements may still be made, and if this were a proper time I might suggest one or two, as General Jackson did a new system of banking when heartily sick of the old, but as they would not effect the principles involved, and relate only to their application, there is no need of waiting till no further improvement *can* be hoped for, as some do.

J. NEAL.

[*From the Boston Courier, Feb. 6, '61.*]

EASY BOOTS AND SHOES.—Some weeks since we called the attention of our readers to a very ingenious application of the principles of anatomy to the manufacture of boots and shoes, made by Dr. Plumer, of Portland. At that time, although we could not but be convinced of the simplicity and correctness of the principle upon which Dr. Plumer's lasts are constructed, we had not the practical experience which now enables us to say that boots made upon them more than fulfill all that their ingenious inventor promises ; they are as easy from the first day "as an old shoe," being at the same time in no way less elegant and tasteful to appearance than the old instruments of torture which are so frequently flung away with execrations both loud and deep. A number of ladies and gentlemen of our acquaintance have availed themselves of the invention of Dr. Plumer, and are unanimous in its praise. It meets with the approval of our best surgeons and physicians, and cannot fail of immediate adoption, wherever it is properly made known. We extract the following from the *Boston Medical and Surgical Journal* of the 31st ult. :

A Sensible Shoe.—We have often heard old people, who have outlived their vanity, talk about "sensible shoes," by which phrase they intended to convey the idea of long, wide, leather receptacles, too large for the feet. This view being too repulsive to the minds of those who had more æsthetic ideas, has not been generally adopted. Unfortunately, the latter have forgotten the danger of forming a shoe upon the principles which guide them in the construction of a bonnet. To vary the shape, as is constantly done, without regard to the confirmation of the foot, is sure to be followed by deformity and all its attendant sufferings.

Dr. Plumer, of Portland, has designed a last upon what, the most skeptical will allow, is, at least a correct principle. He has taken the foot itself as a model, and given it support where the latter is most needed, and avoided pressure which could only be injurious. The principle improvements are in the shape of the sole, and the position of the heel, and we feel persuaded that the adoption of them would add much to the comfort of those who

"Sow in suffering what they reap in corns."

TO DR. JOHN C. PLUMER,

Dear Sir :—After wearing two pairs of the anatomical boots, made upon your "Patent Lasts," long enough to satisfy myself that the principles are safe and reliable, though improvements may be made in the application or manufacture, I answer without hesitation that I regard your "Patent Last" as one of the best inventions of our day.

Yours with respect,

JOHN NEAL.

Portland, Dec. 21, 1861.

ROXBURY. Sept. 18th, 1860.

D. ROBINSON, JR. & Co.,

Gentlemen :—I am very much pleased with the shoes I had made for myself and my son, from Dr. Plumer's "Patent Last," and I propose to send for more soon.

Your obedient servant,

D. G. HASKINS.

[From Professor Packard, Bowdoin College.]

BRUNSWICK, Nov. 5, 1860.

Messrs. E. SHAW & Co.,

Gentlemen :—The shoes were received, and proved, an excellent fit. I never had new shoes so comfortable, and judge the "Patent Last" is the one for me.

Respectfully yours,

A. S. PACKARD.

SOUTH BEND, (Ind.), Feb. 16, 1861.

D. ROBINSON & Co., Portland, Me.

Gentlemen :—Having for a week past worn the boots made for me upon the "Patent Last" invented by J. C. Plumer, M. D., I feel qualified to report concerning them.

I have heretofore had much difficulty in finding boots which would suit my feet, and have usually been obliged, for the sake of ease, to select those which were considerably larger than necessary. From the closeness and neatness of the fit in the pair you made, I was apprehensive of a similar difficulty; but to my gratification, I have found that they do not in the least cramp the foot in walking. The first thing which struck me was the greater firmness and security given to the tread by the position of the heel; the next, the support which the ball of the foot receives, and the free play allowed to the muscles of the toes. These peculiarities give the boot an advantage for pedestrian exercise over all others with which I am acquainted.

There is no part of our clothing in which a reform is more needed, and I hope that your success may partly falsify the classic proverb, and prove that the shoe maker may at least go beyond his *old-fashioned last*.

Respectfully yours,

BAYARD TAYLOR.

BOSTON, Feb. 6th, 1861.

DR. PLUMER,

Dear Sir:—Having lately had our attention called to your circular, containing an exposition of the scientific principles upon which your novel and ingenious Anatomical Last is constructed, our interest has been somewhat enlisted in favor of the successful introduction of its merits to the public. We deem it an invention, the adoption of which is highly commendable to all, believing it a most excellent method of properly adjusting the shape of the shoe to the anatomical structure of the foot, thereby preventing and correcting the various distortions to which that organ is inevitably liable, from the use of boots and shoes made upon the common shoemaker's last. Assured of the concurrence of the views and wishes of the rest of our fellow students, and hoping it may meet your pleasure and convenience, we would be much gratified to have you make a practical demonstration of the subject before the Harvard Medical Class.

Yours truly,

W. E. HAYDEN, Ky. ;	S. A. JENKINS, N. Y. ;	W. L. BOND, Mass. ;
D. K. WARREN, Wis. ;	L. D. PACKARD, Mass. ;	O. C. TURNER, Mass.
T. S. FLOYD, N. H. ;	G. P. PRATT, Mass. ;	

J. C. PLUMER, M. D.

NEW YORK, Feb. 23, 1861.

DR. PLUMER,

Dear Sir:—In concurrence with the above, the undersigned, members of the Medical Class of the Medical Department of the University of New York, request you to give them a practical demonstration of the principles involved in the construction of your improved "Shoemaker's Last."

J. T. WARNER, N. Y. ;	G. H. ROBERTSON, Tenn. ;	N. MATISON, N. Y. ;
W. F. SMITH, Va. ;	WM. A. JOHNSON, Tex. ;	A. D. SMITH, Ga. ;
D. W. BALLENTINE, Pa. ;	L. C. GENTRY, N. C. ;	C. A. PASSMORE, N. Y. ;
ALEX. HARVEY, Ca. W. ;	O. M. PRAY, Brooklyn ;	A. C. L. HINDSMAN, Ga. ;

NEW YORK, Feb. 23, 1861.

DR. PLUMER,

Dear Sir:—The undersigned, members of the Medical Class of the College of Physicians and Surgeons of the Medical Department of Columbia College, would be gratified to have a practical demonstration of the scientific principles upon which your "Patent Last" is constructed.

B. B. BRASHEAR, A. M. O.	ALBERT FAIRFAX, Va. ;	J. W. ROBIE, N. H. ;
S. N. BRAYTON, Mass. ;	A. M. GREGORY, N. J. ;	N. SMITH, JR., A. M., N. Y.
E. S. CAREW, Ala. ;	A. A. MCCLURE, Nassau ;	G. R. WELLS, M. D., Wis.
F. G. D'UTASSY, N. S. ;		

PHILADELPHIA, Feb. 28, 1861.

DR. PLUMER,

Dear Sir:—The subscribers, members of the Class of 1860-61 of the Jefferson Medical College, request you to give them a demonstration of the principles involved in your improvement in the construction of Boots and Shoes.

M. H. PICOT, Phil., Pa. ;	L. W. ALGER, Mass. ;	W. F. WOOLSEY, Penn. ;
W. W. KEEN, JR., Phil. ;	L. K. BALDWIN, Dela. ;	I. S. BEST, Ill. ;
C. HANGER, Mo. ;	I. H. SIMPSON, N. C. ;	M. A. BROWN, Mo. ;
A. J. HERR, Penn. ;	L. A. WAILES, Miss. ;	A. P. SNOW, M. D., Me.
L. H. PEASE, Conn. ;		

PORTLAND, Dec. 12, 1860.

My Dear Doctor :

I received in due season the pair of boots made on your "Patent Last," and cheerfully add my testimony as to the exceeding value of your invention. It is not a little singular that while the most eminent surgeons have devoted a good deal of attention to the subject of corns and bunions, as well as the more serious distortions of the foot produced by badly made and ill-fitting boots and shoes—no one has gone to the root of the evil, by suggesting the necessary alterations and modifications of the common last, until you turned your attention to the subject ; although Prof. Meyer of Zurich seems to have given his attention to it almost simultaneously. That the alterations made by you are entirely novel, I presume, admits of no doubt ; and that they are made on thoroughly scientific principles is equally unquestionable. The real wonder is, that these alterations have never been made before, with all the suffering and deformity that the world has felt, and surgeons so often seen, from injured and distorted feet.

If any one were asked how a last should be constructed on which to make a shoe that should the most perfectly fit a human foot, it would seem as if there could be but one answer—"to make it in the form of the more solid structure of the foot." Yet in the ordinary last, the form is, in its most essential parts, diametrically the reverse. As a natural consequence, when the shoe is made it has to be worn in discomfort, until the foot itself is has pressed it into the shape that should have been originally given it by the last. If the foot be perfectly sound, this may be done without much injury. But in the vast majority of cases, it is in reality accomplished only by a serious injury to the foot ; and corns, bunions, callosities, and deformities are the almost inevitable result. All this, I believe, is entirely remedied by your "Patent Last," and in addition to all this, a most important improvement is added, by throwing the weight of the body where the conformation of the foot plainly shows it was intended by the Creator to be borne.

That those who have suffered from injured and distorted feet will at once avail themselves, and with great comfort, of your excellent Last, I cannot doubt. And to all, it seems to me equally important. To the young—to children—where feet are forming as they grow, it is of no less value ; allowing them to take all necessary exercise and preserving and developing the natural form and proportions of the foot. To ladies especially, whose health is so dependent on regular exercise, it is of unquestionable value. For them—in our climate—thick soles are of the greatest importance. These made on the shoe formed upon the ordinary last, render it hard, unyielding, and trying to the foot ; and before the shoe has become formed to it, which it can only be imperfectly at the best, the foot has become tender and perhaps lame. But upon the shoe made on your last, the thick soles can be placed, and the shoe worn with all the comfort of an old and well-fitted one ; coming, as it does, from the maker's hands precisely adapted to the natural form and arches of the foot. The mechanical support afforded by a thick sole can only be appreciated by those who have tried both thin and thick.

These are some of the important ends attained by your excellent Lasts, which I believe will be sufficiently and at once apparent to all who use them.

That you may reap the pecuniary reward which your skill and ingenuity so well entitle you to, is my earnest wish. I remain, dear Doctor, as always, faithfully your friend,

GILMAN DAVEIS, M. D.

To J. C. PLUMER, M. D.

My Dear Doctor :—

It gives me pleasure to add my testimony to the value of the "Patent Last," to the originality and accuracy of the scientific principles on which it is based, as well as to its great practical utility—and to express my entire concurrence with the views contained in the letter above from my friend Dr. Daveis.

Yours very truly,

JOHN T. GILMAN, M. D.

TESTIMONIALS

I have given time enough in examining the "Patent Last," invented by Dr. Plumer, to give this opinion, viz. : that it appears to me that it is formed on correct principles, and that it will probably be found to answer most valuable purposes.

In regard to the details, I do not discover any fault ; but if there be any, experience will probably soon lead to the correction of it.

I know that the amount of evil to the feet, and indirectly to the health, from faults in the shoes and boots commonly worn, is very great, and if all these evils should not be removed, I feel well assured that a great part of them would be, by the use of the "Patent Last" above referred to, after the corrections which experience will teach.

JAMES JACKSON, M. D.

Boston, Dec. 28th, 1860.

"I concur in the above."

HENRY J. BIGELOW, M. D.

Boston, Jan. 2, 1861.

It is rather remarkable that in almost every part of the world where shoes are worn, either for protection or ornament they are liable to produce more or less uneasiness, distortion, or actual disease of the foot. This remark does not apply alone to what may be called the easier, or fashionable class of society ; it is equally true with regard to those who are obliged to work for their daily bread.

A person having charge of a hospital, where all kinds of affections of the lower extremities are constantly presenting, is very much struck with the distorted condition of the feet in working people.

The great toe is usually pushed outward so as to produce an enlargement of the bone, or disease over the articulation of the first joint, and the little toe is crowded inwards with a hardened excrescence on its outer surface, or it will be found that all the toes have been so forced together, that one of them, generally the second is misplaced either above or below the others, and the ends of them are so pressed down and stiffened in that position, as to be very much shackled in their motions, thus affording a striking contrast to the foot in its natural condition, where the toes are almost as pliable as the fingers, and the foot can be educated to perform some of the duties of the hand.

To prevent these troubles and deformities, and to place the foot in as comfortable a condition as possible, Dr. Plumer has invented a last which, so far as I have examined it, and am capable of understanding its objects, is likely to remove some of the objections to shoes as they are usually made. At any rate, if a single fault can be remedied in the ordinary method of construction of shoes, it is worthy the attention of the public.

J. MASON WARREN, M. D.

Boston, April 15th, 1861. }
49 Harrison Avenue. }

DR. J. C. PLUMER:

Dear Sir:—It gives me pleasure to state to you the result of my experience in the use of boots and shoes made upon your Patent Last.

An early investigation of the principles involved in your invention enlisted my judgment in its favor, as I think they would not fail to impress any one favorably who has studied the *solid structure* of the human foot.

A practical experience of my own, and also that of several members of my family for nearly six months, has fully convinced me of the correctness of these impressions.

In consequence of extreme sensitiveness occasioned by a rheumatic affection, my wife has hitherto been unable to wear a boot or shoe of suitable thickness and firmness for the safety of her health in street walking, until she tried those made upon your last, which we are happy to say have answered the purpose perfectly.

Your improved last produces a boot or shoe perfectly comfortable at first, no matter how thick and substantial the soles; and the importance of these for pedestrian purposes cannot be exaggerated. In the wet weather they are indispensable to the preservation of health, and upon hard and rough pavement, the mechanical support afforded the foot is essential to its integrity and comfort.

I will farther add, that I most heartily concur in the remarks on this subject by my venerable friend and former teacher, Dr. James Jackson.

JOHN W. WARREN, M. D.

PORTLAND, Dec. 22, 1860.

Dear Sir:—Without having had any practical experience as to the advantages to be derived from the use of your "PATENT LAST," I am convinced that it is constructed upon correct principles.

By the aid of your ingenious diagrams and models which you have kindly explained to me, these principles are easily apprehended, and the application of them in the manufacture of a proper covering for the feet must be preventive and frequently remedial of the diseases which, in the old method, are so numerous and so frequently attended with pain and deformity.

Fully conscious also of the beneficial effects upon the general health which walking "made easy" and pleasant would produce in so many ways that readily suggest themselves to all, I cannot but express the gratification I feel that you should have directed your attention to this subject; and add my best wishes that your efforts should meet with the ample reward which, in my opinion, they richly merit, and be followed by even greater success, if possible, in perfecting an improvement so much to be desired.

I remain very truly yours,

WM. WOOD, M. D.

TO J. C. PLUMER, M. D.

NEW YORK, April 12, 1861.

My Dear Doctor:—I am wearing with the utmost ease and satisfaction the "Anatomical boots." I believe they are constructed upon truly scientific principles. The long and transverse arches of the foot are preserved. The heel is

made firm and solid, and they are altogether the most comfortable walking boot I have ever worn. You have done the human family a great good by this invention, for it is evident that deformities of the feet may be prevented in the young, and more or less perfectly corrected in the old, by wearing coverings made upon your "Patent Lasts."

Very truly, yours, etc.,

D. S. CONANT, M. D.,

133 Fourth Avenue.

(From the Boston Daily Courier of May 21st, 1861.)

LITERATURE.

WHY THE SHOE PINCHES: a Contribution to Applied Anatomy. By Hermann Meyer, M. D., Professor of Anatomy in the University of Zurich. Translated from the German by John Stirling Craig, L. R. C. P. E., etc. American Edition: edited by J. C. Plumer, M. D. Pamphlet, 8vo., pp. 24, with illustrations.

We have previously, on several occasions, called the attention of our readers to the improvements which have been recently introduced into the manufacture of boots and shoes by the American editor of the brochure before us. After reading the little book by which Dr. Plumer's most ingenious adaptation of the covering of the foot to its anatomical structure was made known, and still more after having had for many months a demonstration of the correctness of the principles upon which this adaptation was made in our own person, we could not but feel that we were conferring a favor upon the public by making the facts as widely known as possible. That Dr. Plumer's invention has attracted the favorable attention of the leading physicians and surgeons of Boston, New York, and Philadelphia, is much, but the combined and universal testimony of wearers in its favor, is more. Not only is the *principle* right, it is also *rightly applied*; and henceforth if any one allows himself to be put to the torture by the sons of St. Crispin, it is his own fault.

The pamphlet, "Why the Shoe Pinches," by Prof. Meyer, is reproduced in this country, says Dr. Plumer in his preface, not on account of the novelty or practical value of its directions, but to show that men of high scientific and professional eminence do not regard the subject as beneath their attention. Dr. Plumer goes on to say, that had this pamphlet been in this country prior to the appearance of his own publication on "The Mechanical Affections, Mechanics, and Mechanical Anatomy of the Bony Structure of the Human Foot" (the little work to which we first called the attention of our readers), it might have been inferred that many ideas had been derived from that source. Such, however, was not the fact. We may add, after a careful examination of both, that notwithstanding Prof. Meyer's great and just reputation, he shows himself much less master of the subject than his American contemporary. The changes which he suggests are evidently far from reaching the real evil, while they necessitate an alteration in the external form of the boot such as no gentleman would care to appear in. This is not the case with boots from Dr. Plumer's last, which, obviating all evils most completely and radically, are yet not inferior in external elegance to any heretofore sold. We may add, for the convenience of our readers, that boots from these lasts are made by Messrs. Moseley & Co., Summer Street; and on a large scale, for the wholesale trade, by Messrs. Lindsley, Shaw & Co., No. 109 Pearl Street.

From the New York Evening Post, May 7, 1861.

"UNTO THIS LAST."

Several months ago we took occasion to call the attention of the readers of the *Evening Post* to a little book entitled "Why the Shoe Pinches," by Prof. Meyer, of Zurich, one of the highest continental authorities on Physiological Anatomy, who has devoted himself particularly to the study of the structure and mechanical adaptations of the feet and lower limbs. In this little treatise the Professor dwells on "the arrogant absurdity of which fashion is guilty in going so far as to determine the shape of our feet," and insists that fashion should take the cut of the shoe from the form of the foot, and not cramp the form of the foot to fit the shoe; and, moreover, proves clearly that "the influence of fashion on the shape of the shoe produces the most baneful effects on the mechanism of the foot and on its soundness, and thus materially affects our moving about and our consequent ability to take a sufficient amount of open air exercise." Other eminent anatomists have called attention to the diseases and serious distortions of the foot produced by badly-made and ill-fitting boots and shoes. Camper, a distinguished anatomist of the last century, in a paper "On the Best Shoe," remarks: "All horse-doctors and horse-fanciers are interested in the shoeing of their horses; numerous papers appear thereon; and shall we not concern ourselves about the foot-gear of man?"

The suggestions of these eminent men, though they attracted considerable attention, were not found practicable, and there was always the objection that the form of the shoe recommended was very clumsy.

It remained for one of our countrymen to suggest a practical remedy for the abuses of the feet, and to furnish a shoe which should be elegant in form, and at the same time perfectly adapted to the needs of the foot in walking. Dr. J. C. Plumer, of Portland, Me., has made the mechanical anatomy of the foot the subject of special study, and has invented a LAST constructed in accordance with the bony and ligamentous conformation of the sole and back part of the foot, when the heel is *elevated*, and he claims that boots and shoes made upon it will not only prevent deformities, but correct those already existing. Dr. Plumer has also published a valuable little treatise on "The Mechanics, Mechanical Anatomy, and Mechanical Distortions of the Bony Structure of the Human Foot," in which he shows that the foot in its natural state is a double arch—a longitudinal arch from heel to toe, and the transverse arch from side to side, upon which two arches the entire weight of the body rests. The shoes made upon the "Patent Lasts" are exactly fitted to support these arches. The last being hollowed from end to end and from side to side, and having indentations and projections exactly where the bones of the normal foot have them, so that the shoe is "broken in" by the shoemaker's hammer, instead of the foot of the wearer, which has heretofore done that work; hence it is found that a pair of new shoes made on the new last are as easy as old shoes of the old pattern. They are constructed with a view to the support of the foot. One important improvement in the new last consists in bringing forward the heel. Dr. Plumer shows that the ball of the foot and the heel are the two abutments upon which the longitudinal arch of the foot rests, and that if the heel be placed too far back

the weight of the body depresses the centre of the arch, which is the instep, and produces the common deformity of a flat or splay foot. Indeed, the whole tendency of boots and shoes constructed in the prevailing style is to break down instead of to support the bony structure of the foot.

We have endeavored to point out some of the advantages of this ingenious invention, and refer our readers to Dr. Plumer's pamphlet, in which he treats the whole subject of the mechanical affections and anatomy of the foot in a very able manner, illustrating his subject by diagrams. Since the introduction of his anatomical last, Dr. Plumer has received numerous letters from scientific and practical men, all of whom give it unqualified praise, and he has been invited by the students in several of our medical colleges to give a practical demonstration of the principles involved in the construction of his last, and they have expressed their approval. It commends itself to surgical attention at once.

Among the many letters received by Dr. Plumer, testifying to the pleasure with which shoes of the new order are worn, the following from Bayard Taylor, the author of "Views A-Foot," ought to have weight.

"SOUTH BEND, IND., February 16, 1861.

"D. ROBINSON JR. & Co. — *Gentlemen*: Having for a week past worn the boots made for me upon the patent last invented by J. C. Plumer, M. D., I feel qualified to report concerning them. I have heretofore had much difficulty in finding boots which would suit my feet, and have usually been obliged, for the sake of ease, to select those which were considerably larger than necessary.

"From the closeness and neatness of the fit, in the pair you made, I was apprehensive of a similar difficulty, but, to my gratification, I have found that they do not in the least cramp the foot in walking.

"The first thing which struck me was the greater firmness and security given to the tread by the position of the heel; the next, the support which the ball of the foot receives, and the free play allowed to the muscles of the toes. These peculiarities give the boot an advantage, for pedestrian exercise, over all others with which I am acquainted.

"There is no part of our clothing in which a reform is more needed, and I hope that your success may partly falsify the classic proverb, and prove that the shoemaker may, at least, go beyond *his old-fashioned last*.

"Respectfully yours,

"BAYARD TAYLOR."

Let Dr. Plumer become the patron saint of our shoemakers — our modern St. Crispin — and we shall stand upon another and much easier footing.

Then may those walk who never walked before,
And those who always walked now walk the more.

COPY OF

SPECIFICATION AND CLAIMS

FOR

PLUMER'S PATENT BOOT AND SHOE.



To all Whom it may Concern.

BE IT KNOWN, THAT I, JOHN C. PLUMER, OF PORTLAND, IN THE COUNTY OF CUMBERLAND AND STATE OF MAINE, have invented certain new and useful improvements in BOOTS and SHOES, and that the following is a full, clear, and exact description of the same reference being had to the accompanying drawing, in which Figure 1 represents a side view of a shoe constructed according to the principles of my invention, Figure 2 represents a transverse section of the same at the line *xx* of Figure 1; Figure 3 represents a transverse section of the same at the line *yy* of Figure 1; Figure 4 represents a transverse section of the same at the line *zz* of Figure 1, and Figure 5 represents a longitudinal section of the same, following the middle line of the sole.

The objects of my invention are to make shoes and boots conform to the *bony and ligamentous structure of the natural foot*, and to obviate the disadvantages which result from the use of boots and shoes constructed in the methods heretofore practiced. My invention is divided into *parts*, which may be used *separately or in combination*, but I believe that a boot or shoe of the best construction will be obtained by using *all the parts* of my invention in *combination* in the same boot or shoe.

THE FIRST part of my invention has reference to that portion of the sole which is beneath the *ball of the foot*. Previous to my invention it has been customary to construct the sole at this portion of equal or nearly equal thickness transversely, and as the sole of the shoe is convex on its exterior, the interior is correspondingly *concave*. A sole of this construction is directly the *reverse* in form of the *bony and ligamentous structure of the natural foot*, which has the form of a *transverse arch*, and is *concave* on its under side; as the foot is constricted by the upper leather of the shoe the tendency is to depress the *transverse arch*

into the *concavity* of the sole of the shoe and to deform the foot, bunion, or the dislocation of the bones of the great toe, being frequently produced.

The object of the first part of my invention is to obviate this tendency, and it consists in combining an outer sole that is convex or flat exteriorly with an insole that is *convex at its upper surface*, the convexity of the insole corresponding in position with the rise of the *transverse arch* of the foot so that the *depression thereof* is effectually prevented.

THE SECOND part of my invention has reference to that portion of the sole which connects the *heel* with that *portion beneath the ball* of the foot, which is commonly called the shank. Its object is to support this portion of the foot both *longitudinally* and *transversely*, and it consists in a shank which is *transversely convex* at its upper surface, in contradistinction to being transversely concave at its upper surface, as has been the case with boot and shoe shanks heretofore in use.

THE THIRD part of my invention has reference to the *shank* and *heel* of a boot or shoe. The human foot is composed of a series of bones and ligaments and fleshly muscles, and is arched longitudinally, the highest portion of the under side of the longitudinal arch being beneath the instep. When the heel rests upon a support which is *higher than the level of the ball* of the foot, the members of which it is composed tend to assume a more arched form, and if this tendency be prevented by the boot or shoe, there is a constant strain upon the foot which sometimes results in the breaking down of the longitudinal arch of the foot, thereby producing FLAT or SPLAY foot, and is always accompanied by the sensation of weariness. The shanks of ordinary heeled shoes have hitherto been made of about the same convexity *longitudinally* that they would have been if the shoes had been made *without* heels; moreover, the heels of the shoes have been set so far back and have been so short that they do not support the *anterior portion* of the heel of the human foot to which a considerable amount of the pressure in walking is applied; hence there has been a constant tendency in the foot to move forward in the shoe, and as this tendency has been counteracted only by the *pressure* of the upper leather *upon* the *instep*, the tendency has been to depress the instep and break down the longitudinal arch of the foot. The object of this part of my invention is to prevent this tendency, and afford an efficient support for the *anterior portion* of the heel of the foot, and it consists in combining the heel of a boot or shoe with the sole thereof in such manner that the heel extends forward *beneath the anterior portion of the heel of the foot*, and is there made *thicker* so as to support the insole in a proper convex form *longitudinally* beneath the foot, the shank of the boot or shoe being shortened in proportion to the advance of the heel.

THE FOURTH part of my invention has reference to the *upper leather* of a shoe. In order that the upper leather of a shoe may fit closely in the hollow a the inner side of the foot, it is advantageous to carry the front edge of the inner quarter as far forward as the most *hollow portion* of that hollow, and it has been customary hitherto to make the quarters at the opposite sides of the foot extend equal distances forward from a central seam at the back of the shoe. By this

mode of construction the seam at the front of the outside quarter is located opposite the corresponding seam at the front of the inside quarter, and is immediately over or in close proximity with the *bony projection at the outer side of the foot*, which is frequently galled by the pressure of the seam. The object of this part of my invention is to relieve the bony projection of the foot from the pressure of the seam without interfering with the fit of the shoe, and it consists in combining the front piece with quarters at the opposite sides of the foot of *unequal* length, so that while the inner quarter extends sufficiently far forward to insure a close fit of the leather to the inner side of the foot, the seam at the front side of the outside quarter is *between* the *bony projection* of the foot and the *heel*.

All the parts of my invention are embodied in the shoe represented in the accompanying drawings. In this shoe the outsole *a* and the insole *bb*, are separated by a filling *c*, of such form that the upper surface of central part *b* of the insole protrudes into the shoe above the lateral portions *bb* of the insole, while the outer surface of the outsole *a* is slightly convex as usual. The protrusion of the insole thus produced corresponds with the rise of the central portion of the transverse arch of the foot, so that this arch is prevented from being broken down by the constriction of the upper leather. The filling *c* gradually decreases in thickness as it approaches the toe of the shoe, so that the inner surface of the insole is there parallel or thereabouts with the outer surface of the outsole *a*. The filling *c* also extends towards the heel of the shoe through the shank *d*, so that the upper surface of the insole of the shank is convex, while the external surface of the shank is of the usual form, which is generally convex; the insole at the shank is thus protruded upward to support the hollow of the foot.

The heel *f* of the shoe represented is extended forward, and its *anterior part* is *raised* to support the insole.

The front edge of the heel may be extended with advantage to a distance from the heel of the shoe equal to one-third the whole length of the shoe, and as a firm support is thereby furnished for the foot beneath the point at which the bones of the leg are jointed to the bones of the foot, the heel may be cut away behind as shown at *g*, so as to diminish the total length of the sole and heel of the shoe. As the front portion of the sole *a* beneath the ball of the foot is not shifted forward by this extension of the heel, the shank of my improved shoe is shorter than the shanks of shoes hitherto made; and as the pressure of the anterior part of the heel of the foot is sustained by the heel instead of by the shank, the employment of steel shank-plates or other means to prevent the shank from being broken down and sustain the foot are unnecessary, and the shank may be made more *flexible* than in boots or shoes hitherto made. The difference between my combination of the heel with the sole, and the old mode, may be seen by a comparison of the representation of the heel and sole of my shoe in Figure 1 with the dotted line *hh*, which represents the outline of the corresponding portions of a shoe of the old construction. In order to afford a firm lateral support of the heel of the foot, the heel of the shoe at the *periphery* is raised above its *central portion*, thus forming the lateral rims *ii*, that sustain

the sides of the heel of the foot and relieve the most protuberant portion thereof of a portion of the pressure to which it is subjected in a shoe of the common construction.

The quarters at the opposite sides of the shoe are of unequal lengths, that on the inner side *j* extends forward from the heel about three-sevenths of the total length of the shoe, terminating at the middle seam *k*. The outer quarter is much shorter, the position of its front edge being indicated by the dotted line *l*, Figure 5; as a general rule the distance of its front edge where it meets the sole from the heel of the shoe should be about one-third of the total length of the shoe.

In order to construct boots and shoes embodying the first three parts of my invention, a LAST should be provided which is the counterpart of the interior of the shoe intended to be made, having concave depressions in the bottom to *correspond* with the transverse rise of the central portions of the insole. But a shoe may be constructed according to my invention by putting its parts together upon an ordinary last, and by fitting a *false insole* of the proper form into it after the last has been withdrawn. The false insole introduced may be kept in place by an adhesive cement, such as glue or India rubber composition, or by means of pegs or tacks. THE FIRST THREE PARTS of my invention are applicable to BOOTS as well as shoes, the fourth part is applicable especially to shoes, but may be applied to those boots which have a *back seam*.

Having thus described a shoe embodying all my improvements, what I claim as my invention in boots and shoes is—

FIRST: The combination of a sole that is flat or convex exteriorly, with an insole that is convex at its upper surface, substantially as described.

SECONDLY: A shank that is convex at its upper surface, substantially as described.

THIRDLY: The combination of an elongated heel with the sole, substantially as described.

FOURTHLY: The combination of the front piece of the upper leather with quarters of unequal length, substantially as described.

TESTIMONIALS.

STATE ASSAYER'S OFFICE, }
Portland, June 15, 1860. }

TO DR. J. PLUMER:

My Dear Sir:—Several months since, while in the pursuit of my official duties, I had occasion to call at your office. While there, my attention was attracted to sundry diagrams which I saw, and on inquiring their meaning, you explained them, and developed to my understanding an invention of great novelty, and which promised to confer a boon long sought after, but until this never discovered. This was no other than the Last as modified and improved by you, in accordance with an eminently philosophical principle. And when I came to comprehend the invention, it commended itself to my judgment as the only correct plan for the construction of a last, and the making of boots and shoes upon it. So thoroughly confident was I of its entire correctness, that I at once ordered a pair of lasts to be made upon the plan, as designed by you. And without awaiting the result of the experiment, I had my wife and her sister measured also for a pair of lasts each, making three several pairs. The shoes made upon these lasts were eminently satisfactory. In my own case they were worn with entire ease and comfort, during a recent journey to Washington, and during my stay there and at Baltimore, I walked several miles a day with less fatigue than I ever remember having experienced on walks of similar lengths before. My wife wore her boots with the greatest comfort, and on temporarily returning to the old style of ladies' boots, was astonished at the difference she found between the new and the old. Her sister, who had always been obliged to buy shoes several sizes too long in order to get those she could wear, at length got a boot which fitted her foot, and reduced it to genteel dimensions. In summing up the advantages of the last, or the shoes or boots made upon it, the following appear to me, evident from my own experience and observation:

1. An accurate and easy fit.
2. The lines of the last conforming to those bounding the skeleton of a well formed foot, must prevent deformities and appreciably correct them when present.
3. The natural arches of the foot are properly supported, and their development is favored so as to produce a firm and elastic tread.
4. The heel being provided with a hollow seat, where it is firmly set, the foot has not a tendency to slide forward in the shoe or boot, producing pressure upon the nail of the great toe, and a liability to the painful disease known as "ingrowing nail."

5. No doubt exists in my own mind that some forms of lameness, dependent upon abnormal tension of the ligaments and tissues in the tarsal arch may be effectually relieved by wearing shoes made upon the last as improved by you.

And further experience will no doubt develop further advantages.

In conclusion I would say, that I have reason to believe that the principle suggested to your mind and followed out by careful and patient reasoning and experiment has now for the first time, been PRACTICALLY and FULLY DEVELOPED and APPLIED. It consists, as I understand, in conforming the outline of

the last to the contour of the osseous ligamentous tissues of a well formed and developed foot, bringing the point of support more directly in the long axis of the body and limbs, diminishing the amount of leather employed in a shoe to the minimum necessary, and conferring advantages which can be most sensibly appreciated by those who suffer from tender feet.

That you may reap an abundant reward for your careful study and ingenuity is my earnest wish.

Yours very cordially,

H. T. CUMMINGS, M. D.,

Assayer to the State of Maine.

ROXBURY. Sept. 18th, 1860.

D. ROBINSON, JR. & Co.,

Gentlemen :—I am very much pleased with the shoes I had made for myself and my son, from Dr. Plumer's "Patent Last," and I propose to send for more soon.

Your obedient servant,

D. G. HASKINS.

[From Professor Packard, Bowdoin College.]

BRUNSWICK, Nov. 5, 1860.

Messrs. E. SHAW & Co.,

Gentlemen :—The shoes were received, and proved, an excellent fit. I never had new shoes so comfortable, and judge the "Patent Last" is the one for me.

Respectfully yours,

A. S. PACKARD.

Dear Doctor :—I like the shoes made on your last so well that I mean to use them altogether, and write now to get you to have me a pair of lasts made and sent on.

Yours truly,

M. BLAIR.

Washington, 24th Nov., 1860.

TO DR. JOHN C. PLUMER,

Dear Sir :—After wearing two pairs of the anatomical boots, made upon your "Patent Lasts," long enough to satisfy myself that the principles are safe and reliable, though improvements may be made in the application or manufacture, I answer without hesitation that I regard your "Patent Last" as one of the best inventions of our day.

Yours with respect,

JOHN NEAL.

Portland, Dec. 21, 1861.

[From the Portland Transcript, Jan. 26, '61]

MR. EDITOR :—That you may grow cucumbers to a bottle, and oblige them to take the shape of the bottle, everybody knows or ought to know. That the human foot may be transformed in the same way, and be made to take upon itself any shape, according to the whim of a shoemaker, ought also to be known, and the sooner the better; lest God's handy work be utterly spoiled by little and little, before the sufferers get their eyes open, or the *understandings* enlightened enough to see or feel the truth.

Having tried the new last of Dr. Plumer, and worn the boots long enough to be able to speak without any serious misgiving, allow me to say, as a matter of duty, and of my own free will, without solicitation, that I look upon the inven-

tion as among the most truly scientific and comfortable, and promising of our age. Of course improvements may still be made, and if this were a proper time I might suggest one or two, as General Jackson did a new system of banking when heartily sick of the old, but as they would not effect the principles involved, and relate only to their application, there is no need of waiting till no further improvement can be hoped for, as some do.

J. NEAL.

[From the *Boston Courier*, Feb. 6, '61.]

EASY BOOTS AND SHOES.—Some weeks since we called the attention of our readers to a very ingenious application of the principles of anatomy to the manufacture of boots and shoes, made by Dr. Plumer, of Portland. At that time, although we could not but be convinced of the simplicity and correctness of the principle upon which Dr. Plumer's lasts are constructed, we had not the practical experience which now enables us to say that boots made upon them more than fulfill all that their ingenious inventor promises; they are as easy from the first day "as an old shoe," being at the same time in no way less elegant and tasteful to appearance than the old instruments of torture which are so frequently flung away with execrations both loud and deep. A number of ladies and gentlemen of our acquaintance have availed themselves of the invention of Dr. Plumer, and are unanimous in its praise. It meets with the approval of our best surgeons and physicians, and cannot fail of immediate adoption, wherever it is properly made known. We extract the following from the *Boston Medical and Surgical Journal* of the 31st ult. :

A Sensible Shoe.—We have often heard old people, who have outlived their vanity, talk about "sensible shoes," by which phrase they intended to convey the idea of long, wide, leather receptacles, too large for the feet. This view being too repulsive to the minds of those who had more æsthetic ideas, has not been generally adopted. Unfortunately, the latter have forgotten the danger of forming a shoe upon the principles which guide them in the construction of a bonnet. To vary the shape, as is constantly done, without regard to the confirmation of the foot, is sure to be followed by deformity and all its attendant sufferings.

Dr. Plumer, of Portland, has designed a last upon what, the most skeptical will allow, is, at least a correct principle. He has taken the foot itself as a model, and given it support where the latter is most needed, and avoided pressure which could only be injurious. The principle improvements are in the shape of the sole, and the position of the heel, and we feel persuaded that the adoption of them would add much to the comfort of those who

"Sow in suffering what they reap in corns."

SOUTH BEND, (Ind.,) Feb. 16, 1861.

D. ROBINSON & Co., Portland, Me.

Gentlemen:—Having for a week past worn the boots made for me upon the "Patent Last" invented by J. C. Plumer, M. D., I feel qualified to report concerning them.

I have heretofore had much difficulty in finding boots which would suit my feet, and have usually been obliged, for the sake of ease, to select those which were considerably larger than necessary. From the closeness and neatness of the fit in the pair you made, I was apprehensive of a similar difficulty; but to my gratification, I have found that they do not in the least cramp the foot in walking. The first thing which struck me was the greater firmness and security given to the tread by the position of the heel; the next, the support which the ball of the foot receives, and the free play allowed to the muscles of the toes.

These peculiarities give the boot an advantage for pedestrian exercise over all others with which I am acquainted.

There is no part of our clothing in which a reform is more needed, and I hope that your success may partly falsify the classic proverb, and prove that the shoe maker may at least go beyond his *old-fashioned last*.

Respectfully yours,

BAYARD TAYLOR.

I have given time enough in examining the "Patent Last," invented by Dr. Plumer, to give this opinion, viz. : that it appears to me that it is formed on correct principles, and that it will probably be found to answer most valuable purposes.

In regard to the details, I do not discover any fault ; but if there be any, experience will probably soon lead to the correction of it.

I know that the amount of evil to the feet, and indirectly to the health, from faults in the shoes and boots commonly worn, is very great, and if all these evils should not be removed, I feel well assured that a great part of them would be, by the use of the "Patent Last" above referred to, after the corrections which experience will teach.

JAMES JACKSON.

Boston, Dec. 28th, 1860.

"I concur in the above."

Boston, Jan. 2, 1861.

HENRY J. BIGELOW.

It is rather remarkable that in almost every part of the world where shoes are worn, either for protection or ornament they are liable to produce more or less uneasiness, distortion, or aetnal disease of the foot. This remark does not apply alone to what may be called the easier, or fashionable class of society ; it is equally true with regard to those who are obliged to work for their daily bread.

A person having charge of a hospital, where all kinds of affections of the lower extremities are constantly presenting, is very much struck with the distorted condition of the feet in working people.

The great toe is usually pushed outward so as to produce an enlargement of the bone, or disease over the articulation of the first joint, and the little toe is crowded inwards with a hardened excrescence on its outer surface, or it will be found that all the toes have been so forced together, that one of them, generally the second is misplaced either above or below the others, and the ends of them are so pressed down and stiffened in that position, as to be very much shackled in their motions, thus affording a striking contrast to the foot in its natural condition, where the toes are almost as pliable as the fingers, and the foot can be educated to perform some of the duties of the hand.

To prevent these troubles and deformities, and to place the foot in as comfortable a condition as possible, Dr. Plumer has invented a last which, so far as I have examined it, and am capable of understanding its objects, is likely to remove some of the objections to shoes as they are usually made. At any rate, if a single fault can be remedied in the ordinary method of construction of shoes, it is worthy the attention of the public.

J. MASON WARREN.

Boston, Feb. 6th, 1861.

DR. PLUMER,

Dear Sir:—Having lately had our attention called to your circular, containing an exposition of the scientific principles upon which your novel and ingenious Anatomical Last is constructed, our interest has been somewhat enlisted in favor of the successful introduction of its merits to the public. We deem it an invention, the adoption of which is highly commendable to all, believing it a most excellent method of properly adjusting the shape of the shoe to the anatomical structure of the foot, thereby preventing and correcting the various distortions to which that organ is inevitably liable, from the use of boots and shoes made upon the common shoemaker's last. Assured of the concurrence of the views and wishes of the rest of our fellow students, and hoping it may meet your pleasure and convenience, we would be much gratified to have you make a practical demonstration of the subject before the Harvard Medical Class.

Yours truly,

W. E. HAYDEN, Ky. ;	S. A. JENKINS, N. Y. ;	W. L. BOND, Mass. ;
D. K. WARREN, Wis. ;	L. D. PACKARD, Mass. ;	O. C. TURNER, Mass.
T. S. FLOYD, N. H. ;	G. P. PRATT, Mass. ;	
J. C. PLUMER, M. D.		

NEW YORK, Feb. 23, 1861.

DR. PLUMER,

Dear Sir:—In concurrence with the above, the undersigned, members of the Medical Class of the Medical Department of the University of New York, request you to give them a practical demonstration of the principles involved in the construction of your improved "Shoemaker's Last."

J. T. WARNER, N. Y. ;	G. H. ROBERTSON, Tenn. ;	N. MATISON, N. Y. ;
W. F. SMITH, Va. ;	WM. A. JOHNSON, Tex. ;	A. D. SMITH, Ga. ;
D. W. BALLENTINE, Pa. ;	L. C. GENTRY, N. C. ;	C. A. PASSMORE, N. Y. ;
ALEX. HARVEY, Ca. W. ;	O. M. PRAY, Brooklyn ;	A. C. L. HINDSMAN, Ga. ;

NEW YORK, Feb. 23, 1861.

DR. PLUMER,

Dear Sir:—The undersigned, members of the Medical Class of the College of Physicians and Surgeons of the Medical Department of Columbia College would be gratified to have a practical demonstration of the scientific principles upon which your "Patent Last" is constructed.

B. B. BRASHEAR, A. M., O.	ALBERT FAIRFAX, Va. ;	J. W. ROBIE, N. H. ;
S. N. BRAYTON, Mass. ;	A. MCL. GREGORY, N. J. ;	N. SMITH, JR., A. M., N. Y.
E. S. CAREW, Ala. ;	A. A. MCCLURE, Nassau ;	G. R. WELLS, M. D., Wis.
F. G. D'UTASSY, N. S. ;		

PHILADELPHIA, Feb. 28, 1861.

DR. PLUMER,

Dear Sir:—The subscribers, members of the Class of 1860-61 of the Jefferson Medical College, request you to give them a demonstration of the principles involved in your improvement in the construction of Boots and Shoes.

M. H. PICOT, Phil., Pa. ;	L. W. ALGER, Mass. ;	W. F. WOOLSEY, Penn. ;
W. W. KEEN, JR., Phil. ;	L. K. BALDWIN, Dela. ;	I. S. BEST, Ill. ;
C. HANGER, Mo. ;	I. H. SIMPSON, N. C. ;	M. A. BROWN, Mo. ;
A. J. HERR, Penn. ;	L. A. WAILES, Miss. ;	A. P. SNOW, M. D., Me.
L. H. PEASE, Conn. ;		

PORTLAND, Dec. 12, 1860.

My Dear Doctor :

I received in due season the pair of boots made on your "Patent Last," and cheerfully add my testimony as to the exceeding value of your invention. It is not a little singular that while the most eminent surgeons have devoted a good deal of attention to the subject of corns and bunions, as well as the more serious distortions of the foot produced by badly made and ill-fitting boots and shoes—no one has gone to the root of the evil, by suggesting the necessary alterations and modifications of the common last, until you turned your attention to the subject ; although Prof. Meyer of Zurich seems to have given his attention to it almost simultaneously. That the alterations made by you are entirely novel, I presume, admits of no doubt ; and that they are made on thoroughly scientific principles is equally unquestionable. The real wonder is, that these alterations have never been made before, with all the suffering and deformity that the world has felt, and surgeons so often seen, from injured and distorted feet.

If any one were asked how a last should be constructed on which to make a shoe that should the most perfectly fit a human foot, it would seem as if there could be but one answer—"to make it in the form of the more solid structure of the foot." Yet in the ordinary last, the form is, in its most essential parts, diametrically the reverse. As a natural consequence, when the shoe is made, it has to be worn in discomfort, until the foot itself is has pressed it into the shape that should have been originally given it by the last. If the foot be perfectly sound, this may be done without much injury. But in the vast majority of cases, it is in reality accomplished only by a serious injury to the foot ; and corns, bunions, callosities, and deformities are the almost inevitable result. All this, I believe, is entirely remedied by your "Patent Last," and in addition to all this, a most important improvement is added, by throwing the weight of the body where the conformation of the foot plainly shows it was intended by the Creator to be borne.

That those who have suffered from injured and distorted feet will at once avail themselves, and with great comfort, of your excellent Last, I cannot doubt. And to all, it seems to me equally important. To the young—to children—where feet are forming as they grow, it is of no less value ; allowing them to take all necessary exercise and preserving and developing the natural form and proportions of the foot. To ladies especially, whose health is so dependent on regular exercise, it is of unquestionable value. For them—in our climate—thick soles are of the greatest importance. These made on the shoe formed upon the ordinary last, render it hard, unyielding, and trying to the foot ; and before the shoe has become formed to it, which it can only be imperfectly at the best, the foot has become tender and perhaps lame. But upon the shoe made on your last, the thick soles can be placed, and the shoe worn with all the comfort of an old and well-fitted one ; coming, as it does, from the maker's hands precisely adapted to the natural form and arches of the foot. The mechanical support afforded by a thick sole can only be appreciated by those who have tried both thin and thick.

These are some of the important ends attained by your excellent Lasts, which I believe will be sufficiently and at once apparent to all who use them.

That you may reap the pecuniary reward which your skill and ingenuity so well entitle you to, is my earnest wish. I remain, dear Doctor, as always, faithfully your friend,

GILMAN DAVEIS.

To J. C. PLUMER, M. D.

My Dear Doctor :—

It gives me pleasure to add my testimony to the value of the "Patent Last," to the originality and accuracy of the scientific principles on which it is based, as well as to its great practical utility—and to express my entire concurrence with the views contained in the letter above from my friend Dr. Daveis.

Yours very truly,

JOHN T. GILMAN.

J. C. PLUMER, M. D.,

IS PREPARED TO DEVOTE ESPECIAL ATTENTION TO THE TREATMENT OF
Mechanico-Surgical Affections of the Human Foot.

FOR THE PRESENT Inquiries may be made and messages left at the establishments of

Messrs. T. E. MOSELEY & Co., Summer St., Boston,
and E. A. Brooks, No. 575, Broadway, New York.

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 The above pamphlets may be had on application by mail or otherwise
to either of the above establishments.

Boston, March 28, 1861.

Dear Sir:—In answer to your favor of the 26th instant. We have now been using your "Patent Last" for the past six months, and from our own personal experience, and observation of that of others, we do not hesitate to pronounce it the best last ever produced.

Respectfully yours,

T. E. MOSELEY & CO., Summer St., Boston.

J. C. PLUMER, M. D.

PLUMER'S PATENT LAST,

Constructed in accordance with the BONY AND LIGAMENTOUS CONFORMATION OF THE BOTTOM OF THE NATURAL FOOT, and ROTUNDITY of the SIDES and BACK PART OF THE HEEL WHEN ELEVATED. In the COMBINATION of the ELEVATED AND ADVANCED POSITION of the HEEL SEAT with the CONCAVE and CONSTRICTED SHANK and CONCAVE SOLE, an entirely NEW AND EMINENTLY SCIENTIFIC PRINCIPLE is involved, which constitutes a decided improvement in Lasts for Boots and Shoes, and insures a boot or shoe unequalled in elegance of fit, in freedom from the straining, tiresome sensation to the foot, and one which is comfortable at first, requiring no "breaking in," and as a consequence much more durable. We shall be pleased to explain the particular features of this improvement to all interested, and are prepared to take measures and make to order, any kind of BOOTS or SHOES, for Ladies, Gentlemen, Misses or Children, and perfect satisfaction guaranteed.

T. E. MOSELEY & CO.,

IMPORTERS, MANUFACTURERS AND DEALERS IN ALL KINDS OF

BOOTS AND SHOES,

Summer St., Boston.

Boston, March 15, 1861.

MESSRS. T. E. MOSELEY & Co.,

Sirs:—Having, for the past six months, been an attentive observer of the results attending your efforts in Boot making upon my improved "Patent Lasts," I avail myself of this opportunity to recommend the productions of your establishment to the public, as preferable to any I have yet met with.

Yours sincerely,

J. C. PLUMER.

All business information in reference to the

PATENT LAST,

may be obtained of PLUMER, BEARCE & ROBINSON, 20 and 22 Pearl St., Boston.

J. C. PLUMER, M. D.,

At the establishment of T. E. MOSELEY & CO., Summer Street, Boston.

Boston, March 15, 1871.

Dear Sir:—In answer to your favor of the 9th instant. We have now been using your "Patent Last" for the past six months, and from our own personal experience, and observation of that of others, we do not hesitate to pronounce it the best last ever produced.

Respectfully yours,

T. E. MOSELEY & CO., Summer St., Boston.

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